XE
·V3
V.20
#1

# EVANSIA

Volume 20 Number 1

**Seville Flowers Mosses: Utah and the West Nomenclatural clarifications and updates**
William A. Weber 1

**Eagle Hill Field Seminars** 9

***Aulacomium androgynum* excluded from Missouri and the Interior Highlands of North America**
Carl Darigo & Bruce Allen 10

**The Bryophyte Flora of Cunningham Park and Alley Pond Park, Queens County, New York. A New Flora From Old Specimens.**
Jon A. Sperling & Eric C. Morgan 11

**Exploring the Effects of Mollusk Herbivory on an Epiphytic Lichen Community**
Abbey L. Rosso and Bruce McCune 15

**A report from the Seventh Annual SO BE FREE Outing**
Kenneth Kellman 22

© March, 2003 by the American Bryological and Lichenological Society

Editor:

Robert E. Magill
Bryology Laboratory
Missouri Botanical Garden
P.O. Box 299
Saint Louis, Missouri 63166-0299
U.S.A.

FAX 314-577-9594

e-mail bob.magill@mobot.org

ISSN 0747-9859

*Evansia* volume 19, number 4 was mailed on 28 January 2003

# Seville Flowers Mosses: Utah and the West
# Nomenclatural clarifications and updates

## William A. Weber

For bryologists studying mosses in the interior western United States, Seville (Bill) Flowers' *Mosses: Utah and the West,* published in 1973 by the Brigham Young University Press, is by far the best single source. Being a posthumous publication, it probably was not completed to Bill's satisfaction. The scientific editing was taken up by Howard Crum, who revised it extensively. Dr. Arthur Holmgren, of Utah State University, saw it through the press. The book contains some of the most handsome original illustrations of mosses ever made, all by the author, and he used a unique method of pagination. In addition to standard page numbers, the families were given consecutive numbers (for example 10 for Pottiaceae) and each paragraph is numbered in the family treatment, e.g. 10:1, 10:2. Within the families the genera are numbered from one onward. The introduction is one of the clearest I have found for introducing students of bryology.

It is obvious that Flowers never completely unraveled the complexity of forms in a few large genera (*Bryum, Brachythecium*) that are still in need of clarification, but he worked at it mightily, making permanent slides of a great many specimens. He also planned to distribute an exsiccati of a hundred sets but did not live to do it. He was a great teacher, but somehow he found time to be close to his students, take them in the field, carry a heavy teaching load, and he spent what must have been enormous amount of time making his magnificent India Ink drawings, a few of which I once had the privilege of placing on display at the Hunt Botanical institute in Pittsburgh.

Bill Flowers was very helpful to me as I began to work on the bryophytes of Colorado. The University of Colorado Herbarium and the University Archive were very fortunate to receive his collections, collecting notebooks, and original art work, and to distribute his exsiccati to other herbaria. It was doubly fortunate for western American bryology that his collection remained in the West where it will be close at hand for future bryologists.

More than two decades have gone by since the book was published, and although it has been a great boon to me in my work with the Colorado flora, I realize that the field has developed to an enormous extent. The multi-volume *Bryophyte Flora of North America* is now in full swing, and many workers have been drawn

University of Colorado Museum, CB265, Boulder, CO 80309,
weber@spot.colorado.edu.

from all over the world to contribute to the assembly of the most up-to-date information. Through no fault of its own, the nomenclature of Flowers' *Mosses: Utah and the West* has become out of date, and the names he used are not always recognized or remembered. Many families and genera have been broken up (in his day almost all of the pleurocarpous mosses in the flora belonged to the Hypnaceae!). In order for amateurs to make better use of the book, I feel it will be useful to have a list of his names and what they mean in today's taxonomy.

I have gone through text and made two lists of species, one in order of appearance (page number) and one in alphabetic order (with authorities). Many of my entries consist of forwarding addresses, i.e., changes of name to reflect current generic concepts; others are statements of my best judgment as I have been able to compare Utah with Colorado taxa. I am fairly sure of most of my statements, but they nevertheless are only points of view. I have not had time to study some critical specimens in depth. My observations may be considered to be educated guesses. They are not given to the reader as Gospel, and are offered for what they are worth. Anyone owning the book can enter these notations on the proper pages. I am certain that these lists will help every serious user of Bill's wonderful book.

I am very much indebted to some other bryologists whose help has been freely given me. Among them are: Bruce Allen (*Fontinalis*), Hans Blom (*Schistidium*), David Cooper (fen mosses), Howard Crum (minute pleurocarps), Patricia Eckel (*Tortella*), Jan-Peter Frahm (*Campylopus, Paraleucobryum*), Henk Greven (*Grimmia*), Dana Griffin III (*Anacolia*), Roxanne Hastings (*Coscinodon*), Lars Hedenäs (*Amblystegiaceae*), Fred Hermann (Colorado), Diana Horton (*Encalypta*), Bob Ireland (*Dicranum*), David Jamieson (*Hygrohypnum*), Timo Koponen (Mniaceae), Brent Mischler (*Syntrichia*), Barbara Murray (*Andreaea*), Ryszard Ochyra (*Palustriella*), Jon Shaw (*Pohlia*), Wilf Schofield (Hypnum), John Spence (*Bryum*), Toby Spribille (Montana taxa), Dale Vitt (*Orthotrichum*), Richard Zander (*Pottiaceae*), and Bill Steere (Arctic mosses).

## LIST 1. WITH THE TAXA ARRANGED BY PAGE REFERENCE

88. *Sphagnum recurvum* = *S. teres*
89. *S. capillaceum*: Probably *S. russowii*
93. *Fissidens limbatus* = *F. bryoides*
103. *Ceratodon conicus*. Probably a form of *C. purpureus* with excurrent costa. Flowers admits "many intergradations."
112. *Dicranella schreberiana* = *Anisothecium schreberianum*.
124. *Weissia tortilis* = *W. eutyches*
126. *Weissia perligulata* = *Trichostomum sweetii.*
128. *Gymnostomum recurvirostrum* = *Hymenostylium recurvirostrum*

139. *Tortella nitida*. Erroneous identification of *T. alpicola*.
146. *Didymodon trifarius* (of American authors) = *D. vinealis* var. *luridus*.
151. *Barbula cruegeri* = *B. indica*
156. *Barbula fallax* = *Didymodon fallax*, possibly correct but also likely to be *D. ferrugineus*
155. *Barbula acuta* = *Didymodon rigidulus*
159. *Barbula bescherellei* = *Didymodon rigidulus*
160. *Barbula vinealis* = *Didymodon vinealis*
161. *Barbula cylindrica* = *Didymodon vinealis*
164. *Phascum cuspidatum* = *Tortula acaulon*
166. *Pottia heimii* = *Hennediella heimii*
168. *Pottia nevadensis* = *Tortula nevadensis*
169. *Pottia arizonica* = *Microbryum starckeanum*
169. *Pottia latifolia* = *Stegonia latifolia*
176. *Aloina pilifera* = *A. bifrons*
178. *Crossidium griseum* = *C. squamiferum*
182. *Crossidium desertorum* = *C. crassinerve*
185. *Desmatodon latifolius* = *Tortula euryphylla*
186. *Desmatodon plinthobius* = *Tortula plinthobia*
188. *Desmatodon obtusifolius* = *Tortula obtusifolia*
191. *Desmatodon laureri* = *Tortula laureri*
193. *Desmatodon cernuus* = *Tortula cernua*
194. *Desmatodon convolutus* = *Tortula atrovirens*
201. *Tortula inermis* = *Syntrichia inermis*
202. *Tortula brevipes* = *cf. Tortula muralis*
204. *Tortula intermedia* = *Syntrichia intermedia*
206. *Tortula princeps* = *Syntrichia princeps*
206. *Tortula bistratosa* = *Syntrichia caninervis*
207. *Tortula norvegica* = *Syntrichia norvegica*
211. *Tortula papillosissima* = *Syntrichia papillosissima*
212. *Tortula ruralis* = *Syntrichia ruralis*
214. *Tortula ruraliformis* (American plants) = *Syntrichia ruralis*
216. *Scopelophila latifolia* = *Crumia latifolia*
233. *Grimmia agassizii* = *Schistidium agassizii*
234. *Grimmia atricha* = *Schistidium atrichum*
236. *Grimmia dupretii* = *Schistidium dupretii*
238. Grimmia alpicola = *Schistidium alpicola*
239. *Grimmia cinclidodontea*. Erroneous reports for *Grimmia (= Schistidium) occidentale*
241. *Grimmia apocarpa* = *Schistidium spp.* (true *S. apocarpum* not known from Utah).
242. *Grimmia apocarpa* var. *conferta* = *Schistidium confertum*
244. *Grimmia apocarpa* var. *ambigua* = *Schistidium ambiguum*

244. *Grimmia rauii* = *Jaffueliobryum rauii*
245. *Grimmia calyptrata* = *Coscinodon calyptratus*
252. *Grimmia donniana.* Probably does not occur in the American interior.
258. *Grimmia affinis* = *G. longirostris*
262. *Grimmia hartmanii var. anomala* = *G. anomala*
273. *Orthotrichum texanum* = *O. rupestre*
276. *Orthotrichum macounii* = *O. laevigatum.*
278. *Orthotrichum affine.* Attribution to Utah flora is incorrect., fide Vitt.
282. *Orthotrichum jamesianum* = *O. pellucidum*
288. *Orthotrichum strangulatum.* Erroneous reports of *O. cupulatum*, fide Vitt.
000. *Orthotrichum flowersii* Vitt. This was published in 1973, possibly after the book.
296. *Orthotrichum garrettii* = *O. diaphanum*
337. *Mielichhoferia macrocarpa* = *Bryum* sp. (fide Cox & Hedderson ined.)
350. *Pohlia rothii* = *P. drummondii*
360. *Bryum angustirete* = *B. algovicum*
364. *Bryum arcticum.* Identity questionable despite Andrews' acceptance.
368. *Bryum turbinatum* = *B.lisae.*, fide Spence (in litt.).
370. *Bryum creberrimum.* An Australian species. American collections are *B. lisae*, fide Spence (in litt.).
372. *Bryum lonchocaulon* = *B. lisae*, fide Spence (in litt.).
374. *Bryum capillare.* Misinterpretation. The correct name for our plant may be *Bryum flaccidum or B. subelegans.* Spence is revising the group.
378. *Bryum bicolor.* No Utah collections fide Vanderpoorten & Zartman (2002).
382. *Bryum argenteum* var. *lanatum* = *Bryum lanatum*, now recognized by Spence.
383. *Bryum sandbergii* = *Roellia roellii*
390. *Mnium orthorrhynchum.* American plants belong to *M. thomsonii.*
360. *Mnium cuspidatum* = *Plagiomnium cuspidatum*
392. *Mnium medium* = *Plagiomnium medium*
394. *Mnium affine.* Utah collections are *Plagiomnium ellipticum*
396. *Mnium punctatum* = *Rhizomnium,* either *R. pseudopunctatum* or *R. magnifolium*
400. *Thuidium abietinum* =*Abietinella abietina*
410. *Leskeella tectorum* = *Pseudoleskeella tectorum*
412. *Leskeella arizonae* = *Lescuraea arizonae*
417. *Eurhynchium substrigosum* = *Rhynchostegium pulchellum*
418. *Eurhynchium pulchellum* = *Rhynchostegium pulchellum*
426. *Brachythecium delicatulum* = *cf. B. oedipodium*
428. *Brachythecium suberythrorrhizon* = *B. erythrorrhizon*
432. *Brachythecium digastrum* = cf. misidentification of *B. erythrorrhizon*
434. *Brachythecium campestre* = cf. misidentification of *B. erythrorrhizon*
436. *Brachythecium oxycladon* = cf. misidentification of *B. erythrorrhizon*

438. *Brachythecium albicans* = cf. misidentification of *B. erythrorrhizon*
440. *Brachythecium starkei* = *B. oedipodium*
446. *Brachythecium asperrimum* = cf. misidentification of *B. erythrorrhizon*
448. *Brachythecium lamprochryseum* = cf. misidentification of *B. erythrorrhizon*
452. *Scleropodium tourretii.* Probably misidentification of *S. obtusifolium*
460. *Amblystegium juratzkanum* = *A. serpens*
464. *Amblystegium kochii* = *A. humile* (P. Beauv.) Crundw.
464. *Amblystegium compactum* = *Conardia compacta*
472. *Amblystegium fluviatile var. noterophilum* = *Amblystegium noterophilum*
474. *Campylium hispidulum.* American collections are *Campylophyllum sommerfeltii*
476. *Campylium chrysophyllum* = *Campyliadelphus chrysophyllus*
478. *Campylium stellatum* var. *protensum* = *C. protensum*
481. *Calliergon stramineum* = *Straminergon stramineum*
482. *Calliergon turgescens* = *Pseudocalliergon turgescens*
495. *Drepanocladus uncinatus* = *Sanionia uncinata*
500. *Drepanocladus fluitans* = *Warnstorfia fluitans*
502. *Drepanocladus exannulatus* = *Warnstorfia exannulata*
505. *Cratoneuron commutatum.* Not in America. Utah plants are *Palustriella falcata*
506. *Cratoneuron decipiens* = *Palustriella falcata*
515. *Hypnum hamulosum.* All such small specimens have turned out to be *H. revolutum.*
516. *Hypnum lindbergii* = *Calliergonella lindbergii*
518. *Hypnum pratense* = *Breidleria pratensis*
520. *Hypnum haldanianum.* No specimen was found in the Flowers herbarium. In Colorado, plants resembling this are slender forms of *Hypnum cupressiforme*, which, curiously, is not listed in the flora.
522. *Plagiothecium pulchellum* = *Isopterygiopsis pulchella*
423. *Plagiothecium muellerianum.* probably a misidentification of *Isopterygiopsis pulchella.*
524. *Platygyrium repens.* Probably a misidentification of *Homomallium mexicanum,* which is common in Colorado, but the specimen has not been studied.
528. *Orthothecium diminutivum* = *Isopterygiopsis pulchella*
529. *Neckera menziesii* = *Metaneckera menziesii*
536. *Fontinalis duriaei* = *Fontinalis hypnoides*
541. *Atrichum selwynii* = *Atrichum undulatum* var. *altecristatum*
543. *Pogonatum alpinum* = *Polytrichastrum alpinum*
544. *Polytrichadelphus lyallii* = *Meiotrichum lyallii*
548. *Polytrichum gracile* = *Polytrichastrum longisetum*

LIST 2. WITH THE TAXA ARRANGED IN ALPHABETICAL ORDER

*Aloina pilifera* = *A. bifrons* (De Not.) Delgadillo
*Amblystegium compactum* = *Conardia compacta* (C. M.) H. Robinson
*Amblystegium juratzkanum* = *A. serpens* (Hedw.) BSG
*Amblystegium kochii* = *A. humile* (P. Beauv.) Crundw.
*Atrichum selwynii* = *A. undulatum* (Hedw.) Beauv. var. *altecristatum* Ren. & Card.
*Barbula acuta* = *Didymodon rigidulus* Hedw.
*Barbula bescherellei* = *Didymodon rigidulus* Hedw.
*Barbula cylindrica* = *Didymodon vinealis* (Brid.) Zander
*Barbula cruegeri* = *B. indica* (Hook.) Spreng., fide Zander
*Barbula fallax* = *Didymodon fallax* (Hedw.) Zander. Possibly correct but also likely to be *D. ferrugineus* (Besch.) Hill
*Barbula vinealis* = *Didymodon vinealis* (Brid.) Zander
*Brachythecium albicans* = cf. misidentification of *B. erythrorrhizon* BSG
*Brachythecium asperrimum* = cf. misidentification of *B. erythrorrhizon* BSG
*Brachythecium campestre* = cf. misidentification of *B. erythrorrhizon* BSG
*Brachythecium delicatulum* = cf. *B. oedipodium* (Mitt.) Jaeg.
*Brachythecium digastrum* = cf. misidentification of *B. erythrorrhizon* BSG
*Brachythecium lamprochryseum* = cf. misidentification of *B. erythrorrhizon* BSG
*Brachythecium oxycladon* = cf. misidentification of *B. erythrorrhizon* BSG
*Brachythecium starkei* = *B. oedipodium* (Mitt.) Jaeg.
*Brachythecium suberythrorrhizon* = *B. erythrorrhizon* BSG
*Bryum sandbergii* = *Roellia roellii* (Broth. ex Roell) Andrews ex Crum
*Bryum angustirete* = *B. algovicum* Sendtn. ex C. M.
*Bryum arcticum.* Identity questionable despite Andrews' acceptance.
*Bryum argenteum var. lanatum* = *B. lanatum* P. Beauv.
*Bryum bicolor*. No Utah collections seen by Vanderpoorten & Zartman (2002).
*Bryum capillare.* Misinterpretation. According to Spence, the correct name for our plant may be *B. flaccidum* De Not. or *B. subelegans* Kindb.
*Bryum creberrimum.* An Australian species. American collections are *B. lisae* De Not., fide Spence (in litt.).
*Bryum lonchocaulon* .= *B. lisae* De Not., fide Spence (in litt.).
*Bryum turbinatum* = *B. lisae* De Not.
*Calliergon stramineum* = *Straminergon stramineum* (Brid.) Hedenäs
*Calliergon turgescens* = *Pseudocalliergon turgescens* (T. Jens.) Loeske
*Campylium chrysophyllum* = *Campyliadelphus chrysophyllus* (Brid.) Kanda
*Campylium hispidulum.* American collections are *Campylophyllum sommerfeltii* (Myrin) Hedenäs
*Campylium stellatum* var. *protensum* = *C. protensum* (Brid.) Hedenäs, ined.

*Ceratodon conicus.* Probably a form of *C. purpureus* (Hedw.) Brid. with excurrent costa. Flowers admits “many intergradations.”

*Cratoneuron commutatum.* American plants are *Palustriella falcata* (Brid.) Hedenäs

*Cratoneuron decipiens* = *Palustriella falcata* (Brid.) Hedenäs

*Crossidium desertorum* = *C. crassinerve* (De Not.) Jur.

*Crossidium griseum* = *C. squamiferum* (Viv.) Jur.

*Desmatodon cernuus* = *Tortula cernua* (Hüb.) Lindb.

*Desmatodon convolutus* = *Tortula atrovirens* (Sm.) Lindb.

*Desmatodon latifolius* = *Tortula euryphylla* Zander

*Desmatodon laureri* = *Tortula laureri* (C. F. Schultz) Lindb.

*Desmatodon obtusifolius* = *Tortula obtusifolia* (Schwaegr.) Mathey

*Desmatodon plinthobius* = *Tortula plinthobia* Sull. & Lesq.) Austin

*Dicranella schreberiana* = *Anisothecium schreberianum* (Hedw.) Dix.

*Didymodon trifarius* (of American authors) = *Didymodon vinealis* (Brid.) Zander var. *luridus* (Hornsch. in Spreng.) Zander

*Drepanocladus exannulatus* = *Warnstorfia exannulata* (BSG) Loecke

*Drepanocladus fluitans* = *Warnstorfia fluitans* (Hedw.) Loeske

*Drepanocladus uncinatus* = *Sanionia uncinata* (Hedw.) Loeske

*Eurhynchium pulchellum* = *Rhynchostegium pulchellum* (Hedw.) H. Rob.

*Eurhynchium substrigosum* = *Rhynchostegium pulchellum* (Hedw.) H. Rob.

*Fissidens limbatus* = *F. bryoides* Hedw.

*Fontinalis duriaei* = *F. hypnoides* C. J. Hartm.

*Grimmia affinis* = *G. longirostris* Hooker

*Grimmia agassizii* = *Schistidium agassizii* Sull. & Lesq.

*Grimmia alpicola* = *Schistidium alpicola* (Hedw.) Limpr.

*Grimmia ambigua* = *Schistidium ambiguum* (C. M. & Kindb.) Blom

*Grimmia apocarpa* = *Schistidium spp.* (true *S. apocarpum* not known from Utah).

*Grimmia apocarpa* var. *conferta* = *Schistidium confertum* (Funck) BSG

*Grimmia atricha* = *Schistidium atrichum* (C. M. & Kindb.) Blom

*Grimmia calyptrata* = *Coscinodon calyptratus* (Hook. ex Drumm.) C. Jens. in Kindb.

*Grimmia cinclidodontea.* Erroneous reports for *Grimmia (=Schistidium) occidentale* Lawton

*Grimmia donniana.* Probably does not occur in the American interior.

*Grimmia dupretii* = *Schistidium dupretii* (Thér.) Blom

*Grimmia hartmanii* var. *anomala* = *G. anomala* Hampe

*Grimmia rauii* = *Jaffueliobryum rauii* (Aust.) Thér.

*Gymnostomum recurvirostrum* = *Hymenostylium recurvirostrum* (Hedw.) Dix.

*Hypnum haldanianum* = *Callicladium haldanianum* (Grev.) Crum. No specimen was found in the Flowers herbarium. Plants resembling this in Colorado are slender forms of *Hypnum cupressiforme* Hedw., which, curiously, is not listed in the flora.

*Hypnum hamulosum*. All such small specimens have turned out to be *Hypnum revolutum* (Mitt.) Lindb.

*Hypnum lindbergii* = *Calliergonella lindbergii* (Mitt.) Hedenäs

*Hypnum pratense* = *Breidleria pratensis* (Koch ex Spruce) Loeske

*Leskeella arizonae* = *Lescuraea arizonae* (R. S. Williams) Wils. & Norris

*Leskeella tectorum* = *Pseudoleskeella tectorum* (Funck ex Brid.) Kindb. ex Broth.

*Mielichhoferia macrocarpa* = *Bryum* sp. (fide Cox & Hedderson ined.)

*Mnium affine*. Utah collections are *Plagiomnium ellipticum* (Brid.) Kop.

*Mnium medium* = *Plagiomnium medium* (BSG) Kop.

*Mnium orthorrhynchum*. American collections belong to *M. thomsonii* Schimp.

*Mnium punctatum*. Possibly Utah has only *Rhizomnium pseudopunctatum* (BSG) Kop., but Flowers was not clear about whether he has seen a second species, *R. magnifolium* (Horikawa) Kop.

*Neckera menziesii* = *Metaneckera menziesii* (Hook.) Steere

*Orthothecium diminutivum* = *Isopterygiopsis pulchella* (Hedw.) Iwats.

*Orthotrichum affine*. Attribution to Utah is incorrect, according to Vitt.

*Orthotrichum flowersii* Vitt. This was published in 1973, possibly after publication of the flora.

*Orthotrichum garrettii* = *O. diaphanum* Brid.

*Orthotrichum jamesianum* = *O. pellucidum* Lindb.

*Orthotrichum macounii* = *O. laevigatum* Zett.

*Orthotrichum strangulatum*. Erroneous reports of *O. cupulatum* Brid., fide Vitt.

*Orthotrichum texanum* = *O. rupestre* Schleich. ex Schwaegr.

*Phascum cuspidatum* = *Tortula acaulon* (L. ex With.) Zander

*Plagiothecium muellerianum*. Probably a misidentification of *Isopterygiopsis pulchella.*

*Plagiothecium pulchellum* = *Isopterygiopsis pulchella* (Hedw.) Iwats.

*Platygyrium repens*. Probably a misidentification of *Homomallium mexicanum* Card., which is common in southern Colorado, but the specimen has not been studied.

*Pogonatum alpinum* = *Polytrichastrum alpinum* (Hedw.) G. L. Smith

*Pohlia rothii* = *P. drummondii* (C. M.) Andrews

*Polytrichadelphus lyallii* = *Meiotrichum lyallii* (Mitt.) G. L. Merrill

*Polytrichum gracile* = *Polytrichastrum longisetum* (Sw. ex Brid.) G. L. Smith

*Pottia arizonica* = *Microbryum starckeanum* (Hedw.) Zander

*Pottia heimii* = *Hennediella heimii* (Hedw.) Zander

*Pottia latifolia* = *Stegonia latifolia* (Schwaegr. ex Schultes) Venturi ex Broth.

*Pottia nevadensis* = *Tortula nevadensis* (Card. & Thér.) Zander

*Scleropodium tourretii*. Probably misidentification of *Scleropodium obtusifolium*

*Sphagnum capillaceum*. Probably *S. russowii* Warnst.

*Sphagnum recurvum* = *S. teres* (Schimp.) Ångstr. ex C, Hartm.
*Thuidium abietinum* = *Abietinella abietina* (Hedw.) Fleisch.
*Tortella nitida.* A misidentification of *T. alpicola.*
*Tortula bistratosa* = *Syntrichia caninervis* Mitt.
*Tortula brevipes* = *cf. Tortula muralis* Hedw.
*Tortula inermis* = *Syntrichia inermis* (Brid.) Bruch
*Tortula intermedia* = *Syntrichia intermedia* Brid.
*Tortula norvegica* = *Syntrichia norvegica* Web. & Mohr
*Tortula papillosissima* = *Syntrichia papillosissima* (Coppey) Loeske
*Tortula ruraliformis.* American plants probably all belong to *Syntrichia ruralis* (Hedw.) Web. & Mohr
*Tortula ruralis* = *Syntrichia ruralis* (Hedw.) Web. & Mohr
*Weissia perligulata* = *Trichostomum sweetii* (Bartr.) Stark
*Weissia tortilis* = *Weissia eutyches* Zander

## Eagle Hill Field Seminars

Bryophytes and bryophyte ecology - June 8-14. Nancy Slack

Advanced *Sphagnum* field Studies - June 15-21. Richard Andrus

Lichens and lichen ecology - June 15-21. David Richardson

Calicioid lichens and fungi: their role in assessing forest continuity - July 13-19. Steven Selva

Crustose lichens of coastal Maine - August 10-16. Irwin Brodo

Bryophytes of offshore islands of eastern Maine - August 17-23. Norton Miller

Plus many more classes on other subjects.

For more information contact **Hunboldt Field Research Institute**, PO. Box 9, 59 Eagle Hill Road, Steuben, ME 04680-0009. Phone (207) 546-2821. Fax (207) 546-3042, e-mail office@eaglehill.us, http://www.eaglehill.us

# *Aulacomium androgynum* excluded from Missouri and the Interior Highlands of North America

Carl Darigo[1] & Bruce Allen[2]

*Aulacomnium androgynum* (Hedw.) Schwaegr. was recently reported (Buck & Harris 2002) new to Missouri and the Interior Highlands. The specimen on which this record was based (*Buck 40028A* NY) had been separated from a collection of the parasitic alga *Epigloea pleiospora* Döbbeler. The *Aulacomnium* collection was of interest to several projects cataloguing the Missouri moss flora, as well as the state's rare and endangered species. As a result of this interest, we borrowed the collection in order to verify its identity.

The collection is very small, consisting of five or six small plants. Nevertheless, on the basis of plant size, habit, its distinctive yellow-green color, inflated alar cells, and upper leaf cell characteristics (see Crum & Anderson 1981), we have no hesitation in calling this collection *Aulacomnium palustre* (Hedw.) Schwaegr. Although *A. palustre* is a common moss in Missouri, the collection does represent a Madison County record (see Gier 1955, Redfearn 2002).

Acknowledgments. We thank William R. Buck for arranging the specimen loan from NY.

## Literature Cited

Buck, W. R. & R. C. Harris. 2002. *Epigloea* (Epigloeaceae) New to North America. Evansia 19 (3): 83-84.

Crum, H. A. & L. E. Anderson. 1981. Mosses of Eastern North America. Vol. 1. Columbia University Press, New York.

Gier, L. J. 1955. Missouri Bryophytes. Transactions of the Kansas Academy of Sciences. 58: 24-49.

Redfearn, Jr., P. L. 2002. Checklist of the Mosses of the Interior Highlands of North America in Arkansas, Illinois, Missouri and Oklahoma. 64 pgs. Ozarks Regional Herbarium, Southwest Missouri State University.

[1] Research Associate, Missouri Botanical Garden, P.O. Box 299, St. Louis MO 63166
[2] Missouri Botanical Garden, P.O. Box 299, St. Louis MO 63166

# The Bryophyte Flora of Cunningham Park and Alley Pond Park, Queens County, New York. A New Flora From Old Specimens.

**Jon A. Sperling[1] & Eric C. Morgan[2]**

Cunningham Park and Alley Pond Park are located in Queens County, in the western portion of Long Island, New York. These two connected parks combine for a total of approximately 578 hectares of mixed vegetation types. Both parks consist of natural forest areas as well as "mixed use" areas such as athletic fields. The purpose of this study is to document the previous Bryophyte flora of the two parks so that current and future studies will have a historical record for comparative purposes. The Vascular flora, forest types, and canopy composition have all been well documented in literature (Greller, 1977, Greller and Garcia, 1986 Lefkowitz and Greller, 1973, Stalter 1981).

This flora is derived from hundreds of specimens collected by Jon A. Sperling between the years 1975 and 1986 during frequent forays into both parks throughout all seasons. The specimens have recently been checked and annotated by both authors and deposited in the Herbarium of Queens College of the City University of New York. The Sphagnaceae had been annotated in 1986 by Richard E. Andrus, of the State University of New York at Binghamton, and those identifications are used here.

In total, 31 families of bryophytes, consisting of 77 species were recorded from the parks. Nomenclature for Class Musci follows that of (Ketchledge, 1980) and Hepaticae follows (Schuster, 1953). Identification in the field and lab was done using the keys provided by Andrus (1980), Crum (1983), Grout (1916), Conard and Redfearn (1979), and Schuster (1953).

## Class MUSCI

Amblystegiaceae
    *Amblystegium serpens* (Hedw.) B.S.G.
    *A. juratzkanum* Schimp.
    *Calliergon stramineum* (Brid.) Kindb.
    *Campylium hispidulum* (Brid.) Mitt.
    *Drepanocladus exannulatus* (B.S.G.) Warnst.
Aulacomniaceae
    *Aulacomnium palustre* (Hedw.) Schwaegr.
Brachytheciaceae
    *B. oxycladon* (Brid.) Jaeg. & Seuerb. var. *oxycladon*

---

[1] Dept of Biology, City University of New York, Queens College
[2] State University of New York at Farmingdale

*Brachythecium calcareum* Kindb.
*B. rutabulum* (Hedw.) B.S.G.
*B. salesbrosum* (Web. & Mohr.) B.S.G.
*Eurynchium hians* (Hedw.) Sande Lac
*Rhynchostegium serrulatum* (Hedw.) Jaeg. & Sauerb.

Bryaceae
- *Bryum argenteum* Hedw.
- *B. caespiticium* Hedw.
- *B. capillare* Hedw. var. *flaccidum* (Brid.) B.S.G.
- *Pohlia nutans* (Hedw.) Lindb.

Dicranaceae
- *Bruchia flexulosa* (Sw. *ex* Schwaegr.) C.Muell.
- *Dicranella heteromalla* (Hedw.) Schimp.
- *Dicranum flagellare* Hedw. var. *minutissimum* Grout.
- *Dicranum fulvum* Hook.

Ditrichaceae
- *Ceratodon purpureus* (Hedw.) Brid.
- *Ditrichum pallidum* (Hedw.) Hampe.
- *Pleuridium subulatum* (Hedw.) Rabenh.

Entodontaceae
- *Entodon cladorhizans* (Hedw.) C. Muell.
- *E. seductrix* (Hedw.) C. Muell.

Fissidentaceae
- *Fissidens taxifolius* Hedw.

Funariaceae
- *Funaria hygrometrica* Hedw. var. *Hygrometrica*
- *Physcomitrium pyriforme* (Hedw.) Hampe.

Grimmiaceae
- *Grimmia apocarpa* Hedw. var. *apocarpa*

Hypnaceae
- *Callicladium haldanianum* (Grev.) Crum.
- *Hypnum curvifolium* Hedw.
- *H. fertile* Sendtn.
- *Isopterygium elegans* (Brid.) Lindb.
- *I. tenerum* (Sw.) Mitt.
- *Platygerium repens* (Brid.) B.S.G.

Leucobryaceae
- *Leucobryum glaucum* (Hedw.) Angstr. *ex* Fr.

Leskeaceae
- *Leskea gracilescens* Hedw.

Mniaceae
- *Mnium cuspidatum* Hedw.
- *Mnium hornum* Hedw.

Polytrichaceae
    *Atrichum angustatum* (Brid.) B.S.G.
    *A. crispum* (James) Sull.
    *Pogonatum pensilvanicum* (Hedw.) P.-Beauv.
    *Polytrichum commune* Hedw.
    *P. juniperinum* Hedw.
Pottiaceae
    *Barbula unguiculata* Hedw.
    *Desmatodon obtusifolius* (Schwaegr.) Schimp.
    *Weissia controversa* Hedw.
Sphagnaceae
    *S. fimbriatum* Wils.
    *S. lescurii* Sull.
    *S. palustre* L.
    *S. platyphyllum* (Braithw.) Warnst.
    *S. subsecundum* Nees.
Tetraphidaceae
    *Tetraphis pellucida* Hedw.
Thuidiaceae
    *Haplocladium microphyllum* (Hedw.) Broth.
    *Helodium paludulosum* (Sull.)Aust.
    *Thuidium delicatulum* (Hedw.)B.S.G. var. *delicatulum*

### Class HEPATICAE

Calypogeiaceae
    *Calypogeia fissa* (L.) Raddi.
Cephaloziaceae
    *Cephalozia bicuspidata* (L.) Dum.
    *C. lunulifolia* (Dum.) Dum.
    *C. pleniceps* (Aust.) Lindb.
    *Odontoschisma prostratum* (Sw.) Trev
Cephaloziellaceae
    *Cephaloziella rubella* (Nees.) Warnst.
Codoniaceae
    *Fossombronia wondraczekii* (Corda.) Dum.
Jungermanniaceae
    *Gymnocolea inflata (Huds.) Dum.*
    *Jamesoniella autumnalis* (D.C.) Steph.
    *Jungermannia leiantha* Grolle.
    *J. gracillima* Sm.
Lophocoleaceae
    *Lophocolea heterophylla* (Schrad.) Dum
Pallaviciniaceae

*Pallavicinia lyellii* (Hook.) Carruth.
Pelliaceae
*Pellia epiphylla*(L.) Corda.
Ptilidiaceae
*Ptilidium pulcherrium* (G. Web.) Hampe.
*Kurzia sylvatica* (Evans) Grolle.
Ricciaceae
*Riccia fluitans* L.
*Ricciocarpus natans* (L.)Corda.
Scapaniaceae
*Scapania nemerosa* (L.) Dum.

### Class ANTHOCEROTAE

Anthocerotaceae
*Anthoceros punctatus* L.
*Phaeocerus laevis* (L.) Prosk.

### Literature Cited

Andrus, R.E. 1980. Sphagnaceae (Peat Moss ) of New York State. Contributions to a Flora of New York State. III. N.Y. State Museum Bull. No. 442.

Conard, H.S. and P.L. Redfearn Jr. 1979. How to know the Mosses and Liverworts Second Edition. WCB McGraw Hill. Boston, Mass.

Crum, H. 1983. Mosses of the Great Lakes Forest. University of Michigan Herbarium. Ann Arbor, Michigan.

Greller, A.M. 1977. A vascular flora of the forested portion of Cunningham Park, Queens County, New York, with notes on the vegetation. Bulletin of the Torrey Bot. Club. 104: 170-177.

Greller, A. M. and O. L.Garcia. 1986. Variation in canopy composition of the forest of Ally Pond Park, Queens County, New York. Bull. Torrey Bot. Club. 113: 36-41.

Grout, A.J. 1916. The Moss Flora of New York City and Vicinity. Published by Author. New Dorp, NY.

Ketchledge, E.H. 1980. Revised Checklist of the Mosses of New York State. Contributions to a Flora of New York State I. N.Y. State Mus. Bull. No. 440.

Lefkowitz, A. and A.M. Greller. 1973. The distribution of tree species on the uplands of Cunningham Park, Queens County, New York. Bull. Torrey. Bot. Club 100: 313-318.

Schuster, R.M. 1953. Boreal Hepaticae. A Manual of the Liverworts of Minnesota and Adjacent Regions. The American Midland Naturalist. 49(2).

Stalter, R. 1981. A thirty-nine year history of the arborescent vegetation of Alley Park, Queens County, New York. Bull. Torr.Bot. Club 108: 485-487.

# Exploring the Effects of Mollusk Herbivory on an Epiphytic Lichen Community

**Abbey L. Rosso and Bruce McCune**

**Abstract.** We excluded mollusks from shrub stems to explore possible effects of herbivory on understory lichen communities in Pacific Northwest forests. Epiphytes on shrubs were compared between exclusion stems and control stems over a 2-year period. Results suggested that crustose lichens in these communities may be significantly affected by mollusk herbivory.

## Introduction

We frequently encounter evidence of mollusk herbivory on lichens in the wet temperate forests of the Pacific Northwest of North America (PNW). Thus, we asked whether slugs and snails influence lichen communities in these, and other forests, where mollusks are common.

Mollusk herbivory has been shown to affect calcicolous lichen communities in other habitats, including the Negev desert of Israel and limestone grasslands in Sweden (Jones and Shachak 1994; Fröberg et al. 1993). The abundance of slugs and snails in PNW forests, along with the markings left by their radulas after grazing, would suggest they may also influence communities of epiphytic lichens. Given that various species of slugs and snails have shown preferences for some lichen species over others (Lawrey 1980; Baur et. al 1994), they may be affecting the composition of some PNW lichen communities as well as lichen abundance.

We chose to look for potential effects of mollusk herbivory by examining lichen communities on understory hardwoods. Our sample size was small and the duration of the experiment short, but we gained knowledge that could be useful to others. Hardwoods were chosen as substrate because they are easily accessible and commonly harbor an abundance of lichens. Following a traditional approach to the study of herbivory, we attempted to exclude mollusks from selected shrub stems and observe any changes in the abundance of epiphytes on the selected stems relative to control stems. As slugs and snails make their homes in the duff, our first objective was to find a way to prevent them from crawling up the stems to graze. Then, while testing methods, we observed changes in the epiphytic communities over a 2-year period.

Dept. of Botany and Plant Pathology, Oregon State Univ., Corvallis, OR 97331, USA.

### Study Site

Our study plot was located in the MacDonald-Dunn State Forest, near the town of Corvallis, Oregon, at 44° 36'N 123° 20'W. The area receives approximately 127 cm of precipitation annually and mollusks are common forest inhabitants. We chose an area within the forest where hardwood shrubs were common in the understory, and evidence of grazing was apparent on the epiphytic lichens. As with other forests in the region, *Pseudotsuga menziesii* was the dominant overstory tree. *Acer circinatum* was the dominant understory shrub in the area, and our chosen substrate for this study.

### Methods

#### Development

Prior to the start of the experiment, we used recently captured slugs of various sizes to test potential methods of mollusk exclusion. Two main methods were tested: copper tape, which is sold as a barrier for controlling garden slugs (e.g. SureFire Products by Consep, Inc., Bend, OR), and a physical barrier. The copper tape reportedly works as a sort of "electric fence", with a slug or snail receiving a slight shock on contact (Gordon 1996). Our physical barrier was empty space between the ground and the study stem, the stem being held in space with monofilament fishing line tied to nearby stems; although the mollusks could access the isolated stem via the fishing line, we presumed this would be much more difficult than crawling along the larger more stable surface of an adjacent stem. Neither of our trial methods would prevent slugs from accessing stems from above, as some species are capable of lowering themselves from mucous cords (Gordon 1996), but we presumed this would be an infrequent occurrence as we had never seen a slug in midair.

In our trials, the fishing line was a much more effective barrier than the copper tape. To facilitate these trials, we placed slugs on suspended stems and watched as they tried to exit, an approach that was much more reasonable than waiting indefinitely for them to attempt to move onto a stem. We found that, in these conditions, slugs would readily crawl over copper tape wrapped around the stem, but appeared to have extreme difficulty extending themselves out across the monofilament line. One very small slug managed to crawl across a section of monofilament, but all others would only extend part of their bodies out along the line, searching the surroundings for other surfaces while keeping an anchor on the stem from which they had left, and finally retreating back to the stem.

#### Application

Within our chosen study area we searched for shrubs that had at least 2 stems with similar lichen abundances, where any of the chosen stems could be cut and hung in their original position from stems above. This proved to be challenging criteria, though we did manage to find 14 pairs. Stems were then randomly assigned to be either cut and hung, or left as controls. For the hanging treatment, a section of stem approximately 1 m long, centered 1.5 m from the base of the stem was marked and cut, with care given to note orientation. The section was then suspended in its original position from adjoining stems with monofilament. To further isolate the section, the base of the stem was removed, as well as all closely hanging branches.

When more than 2 similar stems were present on a given shrub (in 6 of 14 cases), a second type of control was attempted in which the stem was girdled. The purpose of this treatment was to assess the effects of killing the stem (necessary for the hanging treatment) on the epiphytic communities. However, our girdles were apparently ineffective, as the girdled stems were still in leaf the second year. Thus, the effects of killing the substrate as a result of hanging stems remains unknown and is a possible confounding variable.

For each stem, lichen cover was assessed on the upper half of a 0.5 m section, centered 1.5 m from the base of the stem (the central 0.5 m of the hung sections). Stems were scored immediately after hanging, and at yearly intervals for 2 years (5-12 Nov. 95; 31 Oct - 10 Nov. 96; 2-5 Nov 97). The site was also checked periodically to assure that stems were hanging in the intended position. One stem pair was lost during the first winter, and 3 pairs were lost or compromised by falling debris during the second winter.

On each stem, percent cover was recorded for each macrolichen species, for total bryophytes, and for 2 categories of crustose lichens: “intact” and “partial”. Intact crusts were areas that had +/- continuous thallus (< 5 % disruption), while partial crusts were areas of broken thallus. Often the areas of discontinuous crust cover were due obviously to mollusk herbivory, with radula markings present. However, thalli that normally grow in a discontinuous manner would also have been scored as partial crusts.

**Analysis**

Our analyses focused on the crustose lichens and bryophytes, as most stems had few macrolichens (10 of the 15 pairs had < 2 % cover). For preliminary assessments, we compared the changes in cover over time between pairs of control and hung stems for bryophytes, intact crusts, partial crusts, and total crust covers. Based on these assessments, cover of intact crust appeared to be a good indicator of mollusk effects. We then used repeated measures analysis of variance with the Huynh-Feldt adjustment for further analysis of intact crust cover, treating the stem pairs as blocks (SPSS, 1998).

## Results and Discussion

The greatest difference between the exclusion and control stems was in the amount of intact (continuous) vs partial (discontinuous) crusts. While change in total crust cover did not differ appreciably between hung or control stems, the amount of intact crust increased, on average, when mollusks were excluded (Fig. 1), with the effects of treatment over time on cover of intact crusts being highly significant (p = .001; Table 1, within subject effects). This would suggest that mollusks are indeed affecting the epiphyte communities to some degree, the lack of herbivory apparently leading to the filling in of discontinuous crusts without the creation of new openings. If feeding were selective, as would be expected from other studies (Lawrey 1980; Baur et. al 1994) and our observations, then herbivory could potentially affect the composition of the communities. It also may affect the relative proportions of lichens to bryophytes, assuming lichens are preferred over bryophytes.

On our study stems there was little or no effect of exclusion on total crust cover (Fig. 1), but total crust cover also changed little over the 2-year period on both control and exclusion stems. Many of the stems had well-developed epiphyte

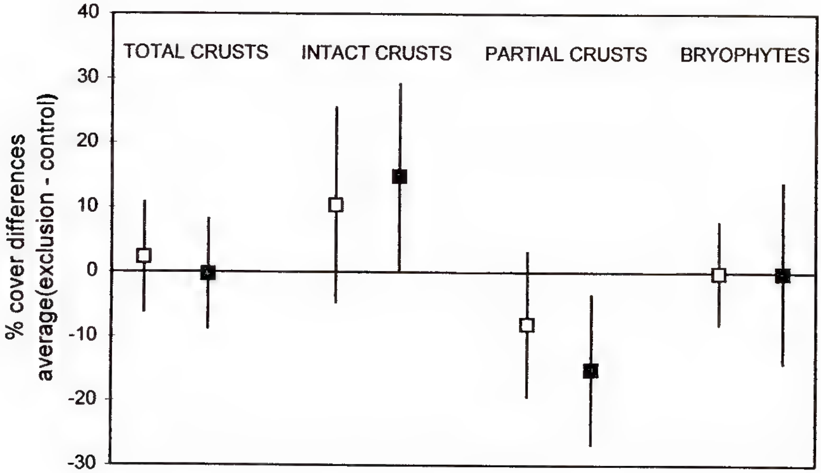


Figure 1. Differences in cover of epiphytes between exclusion and control stems after 1 and 2 years. Open symbols = average after one year, filled symbols = average after 2 years; error bars = 1 standard deviation.

communities with relatively little unoccupied surface; in earlier stages of community development it may be that herbivory would play a larger role in shaping these communities, including the total cover of crusts. Change in total bryophyte cover was also comparable between control and exclusion stems (Fig. 1), though bryophyte cover increased an average of 63% over the 2 years. The lack of difference between control and exclusion stems suggests that the mollusks did not appreciably affect bryophyte cover, either directly (through herbivory) or indirectly, via effects on neighboring lichens. The increase in bryophyte growth at a time when lichen cover is not increasing is consistent with the idea that bryophytes may out-compete lichens over the long-term in the understory of PNW forests (Ruchty et al. 2001).

Overall, it did appear that the exclusion method worked. Although there may have been some difference between control and hung stems at the beginning of the study ($p = .067$; Table 1), the assignments were random, and the results were based on changes over time. The differences we saw between control and exclusion stems were highly variable, the averages over all pairs representing a combination of little change on most stems and occasional larger changes on a few stems. This is as might be expected for random herbivory events; in many cases the changes in the amount of intact crust on control stems came with obvious signs of herbivory. In one case there was a decrease in the amount of intact crust on an exclusion stem, along with signs of herbivory, suggesting the method is not completely effective. However, this one instance was the exception. This study was also intended as a small trial experiment, and a larger sample size would capture more accurately any effects of exclusion, especially given the apparent sporadic nature of the grazing events.

One outstanding limitation to the method is the effect of cutting the stems for hanging. After 2 years the hung stems were beginning to show signs of decay (some fungal growth) and would not likely be appropriate for longer comparisons. The effects of death and decay of the hung stems on the lichens is a confounding factor that we were not able to account for. However, similar bryophyte and total crust growth on control versus exclusion stems would suggest that the epiphyte communities were, in general, behaving similarly with respect to their substrates for the duration of this study. Furthermore, changes in crust communities were sporadic, with signs of herbivory often evident, suggesting results were not due to changes in the substrates.

**Acknowledgements**. We thank Roger Rosentreter and Mark Powell for help in the field. The first author also gives special thanks to Roger for providing encouragement and laughs throughout.

Table 1. Repeated measures analysis of variance comparing intact crust cover across treatments (mollusk exclusion vs. control) blocks (pairs of stems from a single shrub), and dates (3 dates over two years).

| | SS | df | MS | F | Sig. |
|---|---|---|---|---|---|
| Main Effects | | | | | |
| Treatment | 432.74 | 1 | 432.74 | 4.22 | 0.067 |
| Shrub (block) | 14611.70 | 10 | 1461.17 | 14.26 | <0.000 |
| Error for Main Effects | 1024.42 | 10 | 102.44 | | |
| Within Subject Effects | | | | | |
| Date | 82.03 | 2 | 41.02 | 1.25 | 0.309 |
| Date x Treatment | 616.76 | 2 | 308.38 | 9.37 | 0.001 |
| Date x Shrub | 849.30 | 20 | 42.47 | 1.29 | 0.287 |
| Error for Within Subject Effects | 658.58 | 20 | 32.93 | | |

## References

Baur, A., B. Baur, and L. Fröberg. 1994. Herbivory on calcicolous lichens: different food preferences and growth rates in two co-existing land snails. Oecologia 98: 313-319.

Fröberg, L., A. Baur, And B. Baur. 1993. Differential herbivore damage to calcicolous lichens by snails. Lichenologist 25: 83-95.

Gordon, D. G. 1996. Field Guide to the Slug. Sasquatch Books, Seattle, WA.

Jones, C. G., and M. Shachak. 1994. Desert snails' daily grind. Natural History, August ed., pp.56-60.

Lawrey, J. D., Correlations between lichen secondary chemistry and grazing activity by *Pallifera varia.* The Bryologist 83: 328-334.

Ruchty, A., A. L. Rosso., and B. McCune. 2001. Changes in epiphyte communities as the shrub *Acer circinatum* develops and ages. The Bryologist 104:274-281.

SPSS, Inc. 1998. SPSS for Windows, release 8.0.1. SPSS, Inc., Chicago, IL.

## A report from the Seventh Annual SO BE FREE Outing

**Kenneth Kellman**

SO BE FREE ( Spring Outing, Botanical Excursion, Foray, Retreat, and Escape to the Environment) is an informal gathering of bryologists designed to facilitate the exchange of ideas, the development of relationships between professionals and amateurs, botanical exploration, escape from the herbarium and laboratory, and fun. The relaxed atmosphere and social setting fosters friendships among people who are all too often isolated around the country. It is a breath of fresh air to meet others who enthusiastically share our fascination with an admittedly obscure science. The long weekends are organized by Brent Mishler, of The University of California, Berkeley, and all participants are grateful to him and his students for their efforts.

The seventh annual SO BE FREE began on March 23, 2002 at the Hopland Research and Extension Center outside of Hopland, a small town in Mendocino County, California, about a two hour drive north of San Francisco. The proceedings got off to an auspicious beginning as early arrivals found *Fissidens fontanus* and the floating form of *Ricciocarpus natans* in a nearby pond, both relatively rare species in California.

After a tasty barbecue, somehow fit in between short rain showers, we convened for the first evening's program. Kerry Heise, our host from the Hopland Research Center, gave us an ecological introduction to the center as well as a quick overview of the research going on there. Second on the agenda was a description by Teresa Sholars (Mendocino Coast Campus, College of the Redwoods, Fort Bragg, CA) of the field trips planned for the next day. The final talk was presented by Ed Dearing, who discussed the various habitats we would visit in Lake County on Monday.

The next morning the skies cleared for the first day's field trip. We carpooled to the nearby Montgomery Woods State Park, where we had permission to collect on a limited basis. Montgomery Woods is a Coast Redwood forest dominated by *Sequoia sempervirens* (D. Don) Endl. with Tanbark Oak, *Lithocarpus densiflorus* (Hook. & Arn.) Rehder , Big- Leaf Maple, *Acer macrophyllum* Pursh. Montgomery Creek flowed nearby the trails, providing riparian habitat as well. The bryological highlight was a single capsule of *Buxbaumia piperi* Best growing the soil of a trailside bank. For most, this was their first encounter with this genus in the wild. Since there was only a single plant observed, no collection was made, but many photographs were taken.

9870 Brookside Ave., Ben Lomond, CA 95005, kkellman@cwia.com

We reconvened at the parking lot for lunch and set off for the second destination of the day—the fascinating Pygmy Cypress swamps in Mendocino County. After a short drive we arrived at Van Damme State Park and took a short hike on a boardwalk built through this remarkable habitat. Several geological and hydrological factors have combined to leach the soil of nutrients and leave vernal channels and pools of highly acidic water. Fully mature Mendocino Cypress (*Cupressus pygmaea* (Lemmon) Sarg.) grow to 1 meter tall, and century old Bolander's Pine (*Pinus contorta* Loudon ssp. *bolanderi* (Parl.) Critch.) grow to only two meters. A great variety of bryophytes can be found growing in the pools, at the bases of shrubs, and on the bark of the trees. Collection in the park was prohibited, but a similar habitat a short way down the road was unrestricted. There we found several species of *Sphagnum* to be quite common, as well as *Aulocomnium palustre, Dicranum howellii, Polytrichum commune,* and *Campylopus introflexus.* The hepatic, *Gymnocolea inflata,* was found submerged among *Sphagnum* and the collection is the first from California west of the Sierra Nevada. *Entosthodon attenuatus* was found growing in the sandy soils along the roadside.

The second evening was split between several short presentations and slides shows illustrating the ongoing bryological projects of the SO BE FREE participants, and identification of the days collections.

Monday was dedicated to visiting several sites in Lake County, guided by David Toren of the California Academy of Sciences. He has been collecting in the county for many years. We started off at Manning Creek where it crosses under Highway 175. The creek provided collections of *Philonotis fontana*, *Bryum gemmiparum*, and, per John Spence, an as yet undescribed segregate from that species (*Bryum species "F")*. The creek was far from the only attraction at this location. Vast outcrops of greywache sandstone yielded *Didymodon norrisii, Grimmia leibergii, G. laevigata,* an as yet undescribed segregate from *Schistidium apocarpum (Schistidium species 1*), and large quantities of the undescribed *Bryum species "E"*. Grassy areas in between the outcrops supported *Entosthodon californicus* and *Bartramia stricta.* The sandstone roadcut permitted excellent side by side comparison of *Syntrichia princeps* and *S. ruralis,* as well as *Encalypta vulgaris* and *Syntrichia bolanderi. Asterella californica, Targionia hypophylla* and several species of *Riccia* represented the hepaticae at the site.

The second stop of the day was in Whispering Pines, also along Highway 175. The focus here was a small creek feeding Strickler Pond. *Platyhypnidium riparioides* grew on rocks in this stream, while the banks yielded *Bryum flaccidum,* both of which are poorly represented in California. On previous visits to this site, Toren had collected fertile *Platyhypnidium riparioides,* which is the only known collection from California with sporophytes. *Alsia californica,* which is abundant in coastal California, but surprisingly rare in Lake County, grew on the bark of nearby trees.

Stop number three had to wait for lunch, but when that was finished, we hiked to Anderson Hot Springs, a sulphurous spring off Anderson Springs Road. The goal here was a vibrant colony of *Mielichhoferia elongata*, complete with capsules. Also fruiting nearby was *Epipterygium tozeri.* Trailside banks through the mixed evergreen forest provided sites for more *Bryum flaccidum* and *B. canariense,* as well as the hepatics, *Jungermannia rubra*, *Cephaloziella turneri* and *Fossombronia longiseta.*

The last site that we visited was up Boggs Mountain at about 1000 m elevation, where Sugar Pines (*Pinus lambertiana* Douglas) shaded small granite rocks. *Andreaea heinemannii, Grimmia mariniana* (marking the northern limit of this species per David Toren), *Orthotrichum rupestre*, and *Hedwigia detonsa* were common on these rocks.

The tired, but very satisfied group of bryologists returned to the Hopland Center to regroup for the evening "program", held at a local brew pub. Suffice it to say that designated drivers ensured the safe return of all.

The final day of the foray took us to Panther Rock, a volcanic outcrop on the hills of the Hopland Center. The group had thinned out radically as people felt the pull of wordly obligations. Along the hike, we found *Ephemerum serratum,* and several patches of sterile *Microbryum* growing among grasses in the grassland. Panther Rock itself was wet and shaded on one side and hot and dry on the other. *Anacolia menziesii* was abundant in the shade, while the dry side yielded *Polytrichum piliferum, Racomitrium heterostichum, and Grimmia leibergii.*

Collecting wasn't always limited to the organized field trips, especially around the Hopland Center. During lulls in the action, dedicated explorers (some might say obsessed) found *Ptychomitrium gardneri* on rocks in Parsons Creek, *Fontinalis duriaei* in a small drainage channel through a meadow, and the ephemerals *Phascum cuspidatum* and *Ephemerum serratum.* Another ephemeral moss, *Entosthodon kochii*, was abundant on poor soil along a rough road through the meadow below the dormitory. This is perhaps the fourth or fifth collection of this moss to date.

The following list is organized by collection site. Collectors are abbreviated as follows: *ATW* Alan Whittemore; *BE* Billy Ellyson; *DN* Dan Norris; *JRS* Jim Shevock; *JS* John Spence; *KH* Kerry Heise; *KMK* Ken Kellman; *MLS* Malcolm Sargent; *TS* Teresa Sholars.

The disposition of each citation follows the collection number in parentheses. (ph) designates the personal herbarium of the collector, (hrec) is the herbarium at Hopland Center. Determinations were made by each collector, and have not been confirmed by the author.

**Montgomery Woods State Park**: 39°13’50”N, 123°23’25”W, 240 m, Upper end of Montgomery Flat along Montgomery Creek in Coast Redwood forest. Mendocino Co.

Mosses

*Alsia californica* (Hook. & Arn.) Sull. *JRS 21896* (CAS)
*Amphidium californicum* (Hampe ex C. Müll.) Broth. *KMK 2190* (CAS), *TS 1405* (CRMC), *JRS 21901*(CAS)
*Atrichum selwynii* Aust. *TS 1406* (CRMC), *MLS 1017* (ph)
*Aulacomnium androgynum* (Hedw.) Schwägr. *KMK 2193* (CAS), *TS 1407* (CRMC), *JRS 21897* (CAS)
*Buxbaumia piperi* Best (Photographs only)
*Claopodium whippleanum* (Sull.) Ren. & Card. *TS 1408* (CRMC), *JRS 21902* (CAS)
*Dicranum fuscescens* Turn. *KMK 2191* (CAS), *KH 2278* (hrec)
*Dicranum tauricum* Sapeh. *MLS 1011* (ph), *JRS 21899* (CAS)
*Dicranoweisia cirrata* (Hedw.) Lindb. *MLS 1012* (ph), *JRS 21898* (CAS)
*Eurhynchium oreganum* (Sull.) Jaeger *TS 1414* (CRMC), *MLS 1018* (ph), *JRS 21891* (CAS), *KH 2280* (hrec)
*Eurhynchium praelongum* (Hedw.) Schimp. in B. S. G. *TS 1415* (CRMC)
*Fissidens crispus* Mont. *JRS 21895, 21900* (CAS)
*Fissidens pauperculus* Howe *KMK 2188* (ph)
*Hypnum subimponens* Lesq. *KH 2273d* (hrec)
*Isothecium spiculiferum BE 3/24/02-10* (HSC)
*Isothecium cardotii BE 3/24/02-11* (HSC)
*Leucolepis acanthoneura* (Schwägr) Lindb.*TS 1409* (CRMC), *JRS 21892* (CAS)
*Metaneckera menziesii* (Drumm.) Steere *TS 1410* (CRMC), *BE 3/24/02-8* (HSC), *JRS 21894* (CAS), *KH 2274* (hrec)
*Orthodontium gracile* (Wils. in Smith & Sowerby) Schwägr. ex B.S.G. *JS 5472* (ph)
*Racomitrium varium* (Mitt.) Jaeg. *BE 3/24/02-07* (HSC)
*Porotrichum bigelovii* (Sull.) Kindb. *JRS 21889,* 21890, 21893 (CAS), *MLS 1013* (ph)
*Rosulabryum capillare* (Hedw.) Spence *KMK 2189* (CAS), *JS 5471* (ph)
*Scleropodium cespitans* (Wils. ex C. Müll.) Koch *KH 2273b* (hrec)
*Scleropodium colpophyllum* (Sull.) Grout *KMK 2192* (CAS)
*Scleropodium obtusifolium* (Jaeg.) Kindb. in Mac. & Kindb. *TS 1412* (CRMC), *BE 3/24/02-6* (HSC)

*Scleropodium touretii* (Brid.) L. Koch *TS 1413* (CRMC)
*Timmiella crassinervis* (Hampe) L. Koch. *KMK 2186* (CAS), *BE 3/24/02-3* (HSC)
Liverworts
*Asterella californica* (Hampe) Underw. *ATW 7006* (ph)
*Calypogeia fissa* Raddi ssp. *neogaea* R.M. Schust. *ATW 6988* (ph)
*Cephalozia lunulifolia* (Dumort.) Dumort. *ATW 6992, 6998, 7000* (ph)
*Cephaloziella turneri* (Hook.) K. Müll *KMK 2187a* (CAS), *MLS 1019* (ph), *ATW 6993, 6995* (ph)
*Chiloscyphus polyanthos* (L.) Corda *ATW 6989* (ph)
*Chiloscyphus profundus* (Nees) J.J. Engel & R. M. Schust. *ATW 6996* (ph)
*Conocephalum conicum* (L.) Underw. *ATW 6999* (ph)
*Fossombronia hispidissima* Steph. *ATW 7008* (ph)
*Frullania californica* (Aust.) Evans *KH 2273c* (hrec)
*Porella navicularis* (Lehm. & Lindenb.) Lindb. *ATW 6987* (ph), *KH 2273a* (hrec)
*Radula bolanderi* Gott. *ATW 7005* (ph)
*Scapania americana* Müll. Frib. *ATW 6990* (ph), *KH 2273* (hrec)
*Scapania bolanderi* Aust. *MLS 1020* (ph), *ATW 6991, 7004* (ph)
*Targionia hypophylla* L. *ATW 7007* (ph)
Hornworts
*Anthoceros sp. JRS 21903* (CAS)
*Phaeoceros sp. ATW 6994* (ph)

**Pygmy cypress swamp** 39°13'50"N, 123°44'46"W, 180 m, Near Little River Airport down the power line on Albion-Little River Airport Rd. Mendocino Co.

Mosses
*Aulacomnium palustre* Schwägr. *KMK 2198, 2206* (CAS), *JRS 21915* (CAS), *KH 2269* (hrec)
*Bryum gemmilucens* Wilcz. & Dem. *JS 5476* (ph)
*Bryum rubens* Mitten *JS 5481b* (ph)
*Bryum pseudotriquetrum* (Hedw.) Gärtn., Meyer & Scherb. *KH 2275* (hrec)
*Campylopus introflexus* (Hedw.) Brid. *KMK 2196* (CAS), *JRS 21904, 21912* (CAS), *MLS 1032* (ph), *KH 2276* (hrec), *DN 103725* (UC)
*Ceratodon purpureus* (Hedw.) Brid. *KMK 2194* (CAS)
*Claopodium whippleanum* (Sull.) Ren. & Card. *DN 103728* (UC)
*Dicranum howellii* Ren. & Card. *KMK 2200* (CAS), *TS 1427* (CRMC), *JRS 21914* (CAS), *DN 103740* (UC)
*Didymodon revolutus* (Card.) Will. *DN 103729* (UC)
*Ditrichum schimperi* (Lesq.) Kuntz. *JRS 21913* (CAS)
*Entosthodon attenuatus* (Dicks.) Bryhn. *KMK 2195, 2197* (CAS), *JRS 21906* (CAS), *MLS 1026* (ph)
*Entosthodon californicus* (Sull. & Lesq.) Crum & Anderson *DN 103734* (UC)

*Eurhynchium oreganum* (Sull.) Jaeger *JRS 21910* (CAS)
*Neckera douglasii* Hook. *JRS 21921* (CAS)
*Orthotrichum papillosum* Hampe *JRS 21916* (CAS)
*Pohlia nutans* (Hedw.) Lindb. *KMK 2204* (CAS), *JRS 21924* (CAS)
*Polytrichum commune* Hedw. *KMK 2210* (CAS)
*Polytrichum juniperinum* Hedw. *JRS 21905* (CAS)
*Rosulabryum torquescens* (Bruch ex De Not.) Spence *JS 5473, 5477* (ph)
*Sphagnum papillosum* Lindb. *KMK 2199* (CAS)
*Sphagnum mendocinum* Sull. *KMK 2201,2202,2207* (CAS), *KH 2284* (hrec)
Liverworts
*Calypogeia muelleriana* (Schiffn.) Müll *KMK 2198a* (CAS)
*Cephalozia lunulifolia* (Dumort.) Dumort. *KMK 2198c* (CAS)
*Cephaloziella turneri* (Hook.) Müll. Frib. *ATW 7009* (ph)
*Cephaloziella sp. ATW 7010* (ph)
*Frullania nisquallensis* Sull. *KMK 2208* (CAS), *ATW 7013* (ph)
*Gymnocolea inflata* (Huds.) Dumort. *KMK 2205* (CAS)
*Kurzia sylvatica* (Evans) Grolle *KMK 2198b* (ph)
*Mylia anomala* (Hook.) Gray *ATW 7011* (ph)
*Riccardia latifrons* (Lindb.) Lindb. *KMK 2209* (CAS), *ATW 7015* (ph)
Hornworts
*Phaeoceros bulbiculosus* (Bertol.) Prosk. *MLS 1025* (ph)

**Manning Creek** 38°59’44”N, 122°56’36”W, 440 m, Off Hwy 175 ca 4 mi west of Lakeport, where Manning Creek crosses under road. Lake Co.
Mosses

*Anacolia menziesii* (Turn.) Par. *KMK 2220b* (CAS)
*Antitrichia californica* Sull. in Lesq. *MLS 1021, 1022* (ph)
*Bartramia stricta* Brid. *BE 3/25/02-4* (HSC)
*Bryum canariense* Brid. *JS 5484* (ph)
*Bryum gemmilucens* Wilcz. & Dem. *JS 5486* (ph)
*Bryum gemmiparum* De Not. *JS 5482b* (ph)
*Bryum sp. (F)* (aff. *B. gemmiparum*) *JS 5482a* (ph)
*Ceratodon purpureus* (Hedw.) Brid. *BE 3/25/02-12* (HSC)
*Didymodon norrissii* Zand. *KMK 2218* (ph), *BE 3/25/02-3* (HSC), *KH 2279* (hrec)
*Encalypta vulgaris* Hedw. *KMK 2216* (ph)
*Entosthodon californicus* (Sull. & Lesq.) Crum & Anderson *BE 3/25/02-13* (HSC)
*Grimmia leibergii* Paris *KMK2212* (ph)
*Grimmia laevigata* (Brid.) Brid. *KMK 2219* (CAS), BE *3/25/02-6* (HSC)
*Homalothecium arenarium* (Lesq.) Lawt. *KMK 2225* (CAS)
*Homalothecium pinnatifidum* (Sull. & Lesq.) Lawt. *KMK 2220* (CAS)

*Orthotrichum lyellii* Hook. & Tayl. *KMK 2222* (CAS), *BE 3/25/02-9* (HSC)
*Orthotrichum rupestre* Schleich. ex Schwägr. *KMK 2221* (CAS)
*Polytrichum piliferum* Hedw. *BE 3/25/02-14* (HSC)
*Pseudobraunia californica* (Lesq.) Broth. *BE 3/25/02-11* (HSC), *KMK 2220a* (CAS)
*Schistidium sp. 1* *KMK 2224* (ph)
*Syntrichia princeps* (De Not.) Mitt. *JRS21927* (CAS)
*Tortula muralis* Hedw. *BE 3/25/02-15* (HSC)
*Timmiella crassinervis* (Hampe) L. Koch. *BE 3/25/02-7* (HSC)
Liverworts
*Asterella californica* (Hampe) Underw. *BE 3/25/02-8* (HSC), *ATW 7020* (ph)
*Riccia campbelliana* M. Howe *ATW 7026* (ph)
*Riccia nigrella* DC. *ATW 7027* (ph)
*Riccia sorocarpa* Bisch. *ATW 7021* (ph)
*Riccia trichocarpa* M. Howe *ATW 7025* (ph)
*Sphaerocarpus texanus* Aust. *ATW 7024* (ph)
*Targionia hypophylla* L. *KMK 2215* (CAS), *ATW 7029* (ph)
Hornworts
*Anthoceros fusiformis* Aust. *ATW 7026* (ph)
*Phaeoceros sp.* *ATW 7022* (ph)

**Whispering Pines** 38°49'03"N, 122°42'49"W, 800 m, Off Hwy 175 near Strickler Pond by church. Lake Co.

Mosses
*Bryum flaccidum* Brid. *JS 5496* (ph)
*Orthotrichum lyellii* Hook. & Tayl. *MLS 1024* (ph)
*Platyhypnidium riparioides* (Hedw.) Dixon *BE 3/25/02-17* (HSC), *KH 2388* (hrec)
*Porotrichum bigelovii* (Sull.) Kindb. *KH 2281* (hrec)
Liverworts
*Chiloscyphus polyanthos* (L.) Corda *ATW 7030* (ph)
*Porella cordeana* (Hüben.) Moore *BE3/25/02-18* (HSC), *ATW 7031* (ph)

**Anderson Hot Springs** 38°49'03"N, 122°42'17"W, 440 m., 2 mi. up Anderson Springs Rd. 3/25/02 Lake Co.

Mosses
*Bryum canariense* Brid. *JS 5505* (ph)
*Bryum flaccidum* Brid. *JS 5501*(ph)
*Ditrichum ambiguum* Best *KH 2390* (hrec)
*Ditrichum schimperi* (Lesq.) O. Kuntze *BE 3/25/02-20* (HSC), *KH 2387* (hrec)
*Epipterygium tozeri* (Grev.) Lindb. *JS 5498* (ph), *MLS 1014* (ph)

*Fissidens bryoides* Hedw. *KH 2386* (hrec)
*Fissidens crispus* Mont. *BE 3/25/02-22* (HSC)
*Grimmia lisae* DeNot. *BE 3/25/02-19* (HSC)
*Mielichhoferia elongata* (Hoppe & Hornsch.) Hornsch. *BE 3/25/02-21* (HSC), *JS 5499* (ph), *MLS 1016* (ph), *KH 2389* (hrec)

Liverworts

*Cephaloziella turneri* (Hook.) K. Müll. *BE 3/25/02-23* (HSC), *MLS 1015* (ph), *ATW 7036B* (ph)
*Cephaloziella sp. ATW 7036A* (ph)
*Fossombronia longiseta* Aust. *ATW 7032* (ph)
*Jungermannia rubra* Gott. *ATW 7035* (ph)

Hornworts

*Phaeoceros sp. ATW 7033* (ph)

**Boggs Mountain State Forest** 38°48’42”N, 122°41’20”W, 1035 m, Road 500 ca 3 mi up from fire station. Lake Co.

Mosses

*Andreaea heinemannii* Hampe & C. Müll. *KMK 2226*(CAS), *BE 3/25/02-24b* (HSC), *KH 2270* (hrec)
*Grimmia mariniana* Sayre *KMK 2227* (ph)
*Grimmia montana* Bruch & Schimp. in B.S.G. *BE 3/25/02-25* (HSC), *MLS 1031* (ph)
*Hedwigia detonsa* (M. A. Howe) Buck & Norris *KMK 2228* (CAS), *BE 3/25/02-27* (HSC)
*Orthotrichum rupestre* Schleich. ex Schwägr. *BE 3/25/02-26* (HSC)

**Hopland Research & Extension Center**, 4070 University Rd, Hopland, CA
Sag Pond: 38°59’55”N, 123°04’27”W, 300 m; Campground: 38°59’58”N, 123°04’38”W, 300 m; Panther Rock: 39°00’16”N,123°04’32”W, 360 m, Mendocino Co.

Mosses

*Antitrichia californica* Sull. in Lesq. *MLS 1023* (ph)
*Anacolia menziesii* (Turn.) Par. *KMK 2233* (CAS)
*Barbula convoluta* Hedw. *KMK 2237* (CAS)
*Bryum canariense* Brid. *JS 5512* (ph)
*Bryum gemmiparum* De Not. *KMK 2239* (CAS)
*Entosthodon kochii* Crum & Anderson *KMK 2230* (CAS, MO)
*Ephemerum serratum* (Hedw.) Hampe *JRS 21888* (CAS)
*Fissidens fontanus* (B. Pyl.) Steud. *KMK 2185* (CAS), *KH 2283* (hrec), *DN 103722* (UC)
*Fontinalis duriaei* Schimp. *KMK 2235* (CAS)

*Grimmia leibergii* Paris *KH 2267* (hrec)
*Gymnostomum aeruginosum* Sm. *KH 2268* (hrec)
*Homalothecium arenarium* (Lesq.) Lawt. *MLS 1027* (ph)
*Microbryum sp. KMK 2234, 2238* (CAS)
*Phascum cuspidatum* Hedw. *KMK 2240* (CAS)
*Philonotis capillaris* Lindb. *KMK 2241* (CAS)
*Pleuridium subulatum* (Hedw.) Rabenh. *MLS 1029* (ph)
*Pohlia wahlenbergii* (Web. & Mohr) Andr. *KMK 2229* (CAS)
*Polytrichum piliferum* Hedw. *KMK 2242* (CAS)
*Ptychomitrium gardneri* Lesq. *KMK 2184* (CAS)
*Racomitrium heterostichum* (Hedw.) Brid. *KH 2772* (hrec)
*Scleropodium cespitans* (C. Müll.) L. Koch *KMK 2231* (CAS)
Liverworts
*Asterella bolanderi* (Aust.) Underw. *ATW 7045* (ph)
*Cephaloziella divaricata* (Sm.) Schiffn. *BE 3/26/02-3* (HSC), *ATW 7049* (ph)
*Fossombronia longiseta* Aust. *ATW 7047* (ph)
*Frullania bolanderi* Aust. *ATW 7046* (ph)
*Porella cordeana* (Hüben.) Moore *BE 3/26/02-2* (HSC)
*Ricciocarpus natans* (L.) Corda. *KMK 2182* (ph), *KH 2277* (hrec), *DN 103723* (UC), *ATW 7044* (ph)
Hornworts
*Phaeoceros sp. ATW 7048* (ph)

**Acknowledgements:** The author would like to thank several people who were instrumental in organizing SO BE FREE, most notably Brent Mishler, his students, and David Toren. A special thanks to Kerry Heise, our very accommodating host at Hopland. The author would also like to thank Jim Shevock, and David Toren for comments on previous versions of this report, and all of the participants who reported their collections to me.

New York Botanical Garden Library
3 5185 00268 8842

## Guide to contributors to *EVANSIA*

The aim of *Evansia* is to provide a vehicle for the presentation and exchange of useful information on North American bryophytes and lichens. Articles are frequently popular in nature rather than technical and are intended to teach and inform both amateurs and professionals. The articles include, but are not restricted to, announcements of and reports on forays and meetings, presentations of techniques and aids for studying and curating lichens and bryophytes, and reports on local floras. Checklists and papers documenting new regional, state, or county records must include voucher specimens (collector and collection number) and an indication of where the specimens are deposited or a literature reference.

*Evansia* is published with the aid of desktop publishing software and manuscripts can be e-mail attachments (see below) or submitted on computer diskette. The diskette must be IBM compatible (any size) with the author's name, manuscript file name, and word processing software indicated on the disk. Most word processing files can be converted with little effort however an ASCII .txt copy should be sent if you are not using a standard word processor or if the file must be converted from an Apple software.

Manuscripts and correspondence may also be submitted by e-mail to the address listed below. The word processed document should be an attachment to a message. After the manuscript has been successfully received it will be acknowledged by e-mail. Please note that if you are sending ASCII text rather than an attachment an original copy of the manuscript must also be sent to the Editor. At this time images can still be a problem if sent by e-mail. A good quality copy of any illustration should also be mailed.

**IMPORTANT:** Authors should not spend time elaborately formatting their manuscript and should avoid numerous font changes, using footnotes, or other special features. When the manuscript is formatted for *Evansia* most of this work will have to be removed. Note that *Italics*, **bolding** and underlining must be included where appropriate. See recent copies of *Evansia* for style and highlighting of similar manuscripts.

**Manuscripts should be sent to the Editor:**

Robert E. Magill, Missouri Botanical Garden
P.O. Box 299, St. Louis, MO 63166-0299.
e-mail: bob.magill@mobot.org Phone (314) 577-5161. Fax (314) 577-0830

EVANSIA
Bryology Laboratory
Missouri Botanical Garden
P.O. Box 299
Saint Louis, MO 63166-0299 USA

NON-PROFIT ORG.
U.S. POSTAGE
PAID
ST. LOUIS, MO
PERMIT NO. 3566

LUESTHER T. MERTZ
LIBRARY
MAY 1 4 2003
NEW YORK
BOTANICAL GARDEN

~~RICHARD C. HARRIS~~
~~NEW YORK BOTANICAL GARDEN~~
~~BRONX NY 10458-5126~~

10458+5153 22

XE
.V3
v.20
#2

# EVANSIA

Volume 20 Number 2

**The Littoral Species of *Verrucaria* of Cape Ann, MA**
Don G. Flenniken and Elizabeth Stuart Gibson 31

**New State and County Mosses for Nebraska**
Robert F. Steinauer 49

**Colorado Bryological Hot Spots. 3. High Creek Fen**
William A. Weber & Ronald C. Wittmann 51

**Additions to the bryoflora of Broxton Rocks Ecological Preserve Coffee County, Georgia**
William R. Buck & Ronald A. Pursell 53

**Mosses of Semiarid Steppes**
**Bitterroot Valley, Ravalli County, Montana**
Judy A. Hoy & Joe C. Elliott 55

© June, 2003 by the American Bryological and Lichenological Society

Editor:

Robert E. Magill
Bryology Laboratory
Missouri Botanical Garden
P.O. Box 299
Saint Louis, Missouri 63166-0299
U.S.A.

FAX 314-577-9594

e-mail bob.magill@mobot.org

ISSN 0747-9859

*Evansia* volume 20, number 1 was mailed on 8 April 2003

# The Littoral Species of *Verrucaria* of Cape Ann, MA

## Don G. Flenniken and Elizabeth Stuart Gibson

**Abstract.** A survey of the lichen genus *Verrucaria* on seashore rocks of Cape Ann in Gloucester, Massachusetts found the six species described in this paper. Keys, descriptions, illustrations, and distributions on Cape Ann are provided. *Verrucaria amphibia* Clemente is reported for the first time in eastern United States. *Verrucaria ditmarsica* Erichsen and *Verrucaria erichsenii* Zschacke are considered to be conspecific. *Verrucaria maura* Wehlenb. is discussed but not yet found.

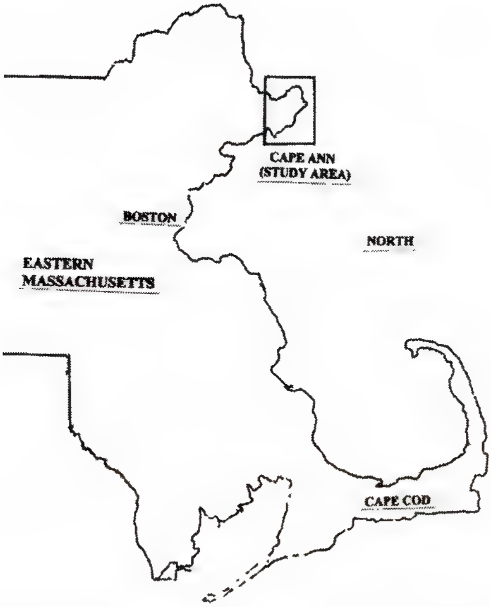
**Introduction.** The lichen *Verrucaria* is a large assemblage of pyrenocarpous lichens that are both terrestrial and aquatic. The aquatic species may be either freshwater or marine. The marine species are found in the Pacific and Atlantic coastal areas.

The species discussed here in this study are found in large part at the low tide of the North Atlantic coast in Massachusetts. Included in this study are a key to species, species descriptions, and illustrations of characteristics. Color photographs can be viewed at http://www.BackRoadLichens.com.

**Study Site.** The study is limited to ten sites in Essex County on Cape Ann between 42°35'– 42°41'N and 70°36'–70°40'W where the tidal range is 2.4 to 3.6 meters (8 to 12 feet). Collections of over 150 specimens were made from the granite coast in coves exposed to the northeast. Most of the *Verrucaria* were found close to the high mark of low tide in areas protected from northeast storms that were microhabitats in the granite boulders between fissures, beneath overhangs, and on downward-facing slopes on the leeward side. No *Verrucaria* were found in generally protected areas like Gloucester outer and inner harbors and the Cape Ann south coast in Manchester or Magnolia.

**Methods.** Collections were made by the second author (ESG), under the name "E.G. Mehlin", during low tide at irregular intervals between September 2001 and May 2002. Nomenclature follows that of Esslinger and Egan (1995). Voucher specimens will be deposited in the Farlow Herbarium.

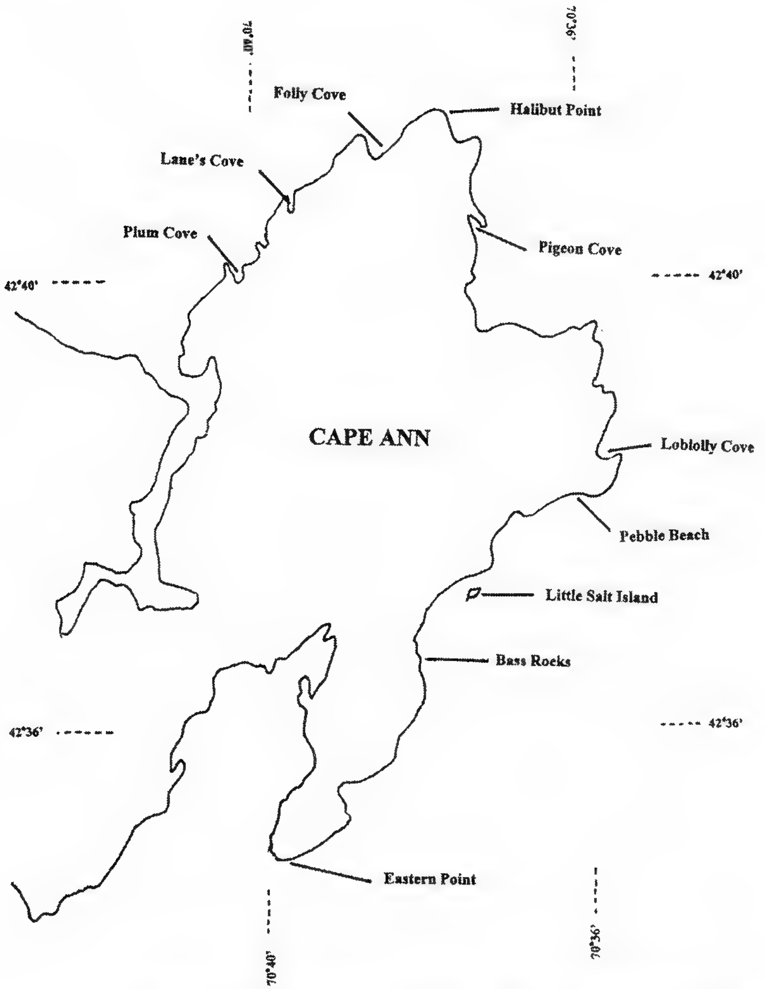
Don G. Flenniken, 2273 Blachleyville Road, Wooster, OH 44691
Flennikend@aol.com
Elizabeth Stuart Gibson, 277 Asbury Street, South Hamilton, MA 01982
emehlin@attbi.com



**Eastern Massachusetts with Cape Ann location indicated**

**Results and Discussion.** Six species of *Verrucaria* were found on the coastal rocks of Cape Ann: *Verrucaria amphibia* Clemente, *Verrucaria degelii* R. Sant., *Verrucaria ditmarsica* Erichsen, *Verrucaria halizoa* Leighton, *Verucaria mucosa* Wahlenb., and *Verrucaria striatula* Wahlenb. *Verrucaria maura* Wahlenb. was expected, but was not found. The *Verrucaria* were often found in association with *Pyrenocollema halodytes* R.C. Harris.

*Verrucaria amphibia* Clemente is recorded for the first time in eastern United States, although Taylor (1982) reported it from Newfoundland. On Cape Ann it was found on both rough and smooth surfaced rocks. It was usually found isolated from other *Verrucaria* species. However, it was found with *V. ditmarsica, V. halizoa, V. mucosa,* and *V. striatula.* It was most often found at the high mark of low tide with the crustose algae, *Hildenbrandia. Verrucaria degelii* R. Sant. was most often found in the upper regions of the tidal zone. It was found on both smooth and rough rock surfaces. Although usually isolated from other *Verrucaria* species, it was found in association with *V. ditmarsica.* Less often, it was found with *V. halizoa* and *V. mucosa.* Several specimens of *V. degelii* were infected with the lichenicolous fungus, *Stigmidium marinum* (Deakin) Swinscow.



**Collection sites of *Verrucaria* on Cape Ann, Massachusetts**

*Verrucaria ditmarsica* Erichsen was the most common species collected and was found within the full range of the tidal zone from the upper regions down to the crustose algae *Hildenbrandia*. It was often found where other species of *Verrucaria* were absent, but also in association with *V. amphibia, V. degelii, V. halizoa, V. mucosa,* and *V. striatula. Verrucaria ditmarsica* looks much like *Pyrenocollema halodytes*, especially on wet rocks.

*Verrucaria halizoa* Leighton was the least common *Verrucaria* species to be found and many specimens were less than one centimeter in diameter in small patches between other *Verrucaria.* It was found at the *Hildenbrandia* level, the high mark of low tide, with *V. amphibia, V. ditmarsica, V. mucosa,* and *V. striatula.*

*Verrucaria mucosa* Wahlenb. was common only on smooth surfaces of rocks from the low tide level of *Hildenbrandia* up to the common rockweed, *Fucus.* Although many specimens were collected without obvious association with other species of *Verrucaria*, it was found with *V. amphibia, V. degelii, V. ditmarsica, V. halizoa,* and, more commonly, with *V. striatula.*

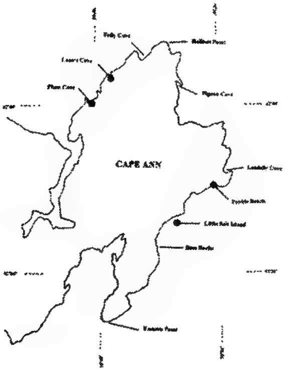
*Verrucaria striatula* Wahlenb. was usually found at the *Hildenbrandia* level, the high mark of low tide in association with *V. amphibia, V. ditmarsica, V. halizoa,* and *V. mucosa.* Nearly all material collected was from protected areas (shade form) and rarely on exposed surfaces (sun form).

### Key to the Species

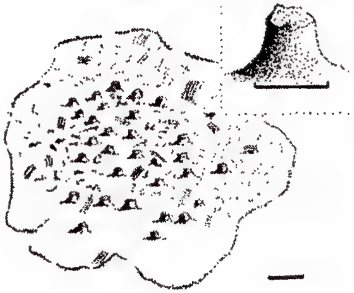
1. Perithecia 0.3 mm or larger in diameter .......... 2
1. Perithecia 0.1 to 0.2 mm in diameter .......... 6
    2. Thallus areolate, without ridges; perithecia often partially immersed and wart-like .......... [*Verrucaria maura*]
    2. Thallus smooth to roughened with ridges, lacking areoles .......... 3
3. Thallus smooth and lacking ridges on the surface .......... 4
3. Thallus with surface ridges .......... 5
    4. Thallus brown to greenish-brown, usually in small defined patches; perithecia dark brown, dome-like .......... *Verrucaria halizoa*
    4. Thallus grass-green, less defined in outline; perithecia black, more or less conical .......... (shade form) *Verrucaria striatula*
5. Thallus dark greenish-black; ridges short, angular or branched, often flat-topped; perithecia more or less conical .... (sun form) *Verrucaria striatula*
5. Thallus dark greenish black to black; ridges very fine, elongated (much like fingerprints); many of the perithecia cylindrical with flattened apices and steep side walls .......... *Verrucaria amphibia*
    6. Thallus smooth, without raised ridges or areoles; perithecia immersed in the thallus, only the black tips showing .......... *Verrucaria mucosa*
    6. Not with the above combined characters .......... 7
7. Areolate, the areoles with thickened, black margins of raised ridges; perithecia immersed .......... *Verrucaria degelii*
7. Areolate or not; ridges, when present, not associated with the areole margins; ridges usually present, short and sometimes y-shaped; perithecia emergent and hemispherical .......... *Verrucaria ditmarsica*

***Verrucaria amphibia*** Clemente has a thin, continuous (although sometimes cracking during drying), sub-gelatinous thallus, dark blackish-green to nearly black (especially when seen on dark colored rocks); the upper surface finely striate with tiny parallel, worm-like, or radiating black ridges, much like fingerprints (best seen with magnification X 20 or greater). Perithecia 0.3-0.6 mm in diameter, sometimes nearly hemispherical, but generally cylindrical, with steep-walled sides and flat or concave apex and irregular margins; involucrellum extending downward to about one-half the depth of the perithecium, a clear gap often present between it and the excipulum; excipulum dark above, light below; spores large, 12-15 X 7-10 µm.

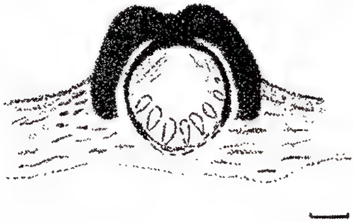
The identifying characters of this species are the minute fingerprint-like ridges and the cylindrical perithecia. *Verrucaria striatula* also has a greenish thallus but with much larger and broader, imbedded or emergent ridges and conical perithecia. *Verrucaria amphibia* may appear similar to *Verrucaria ditmarsica*, but close examination will reveal the shorter, broader, often curved or y-shaped ridges of *V. ditmarsica* and a thin, brownish, nearly transparent thallus.



Collection sites of *Verrucaria amphibia*



*Composite drawing of thallus*



*Section of perithecium*

*Verrucaria amphibia.* Composite drawing of the characteristics of the thallus, perithecia shape, and perithecia structure.

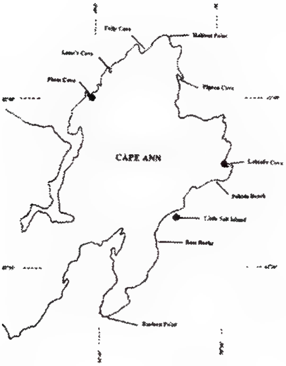
| Scale bar | Form | Color | Texture |
|---|---|---|---|
| Thallus = 1.0mm<br>Inset = 0.5 mm | Smooth or ridged | Black ridges on green | Non-gelatinous |

Section through perithecia showing flattened apex, steep-walled sides, downward spreading involucrellum, dark excipulum above, light below and with a clear space separating the involucrellum from the excipulum.

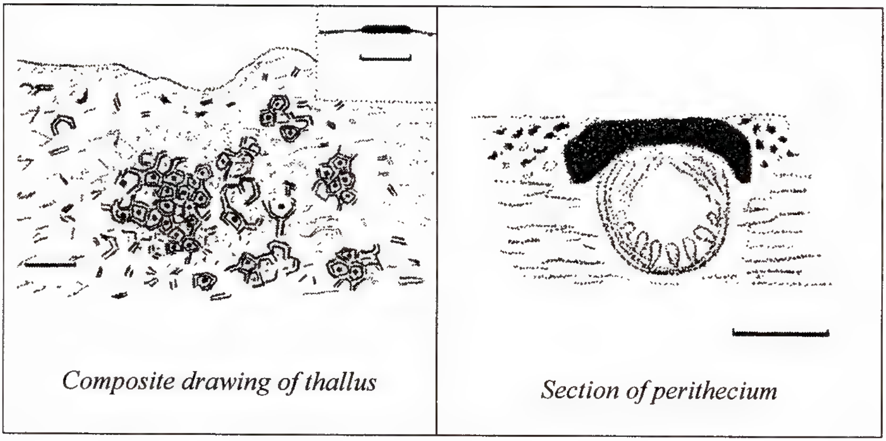
| Scale bar | Shape | Perithecium Size | Spore Size |
|---|---|---|---|
| 0.1 mm | Cylindrical, flat-topped | Large<br>0.3-0.6 mm | Large<br>12-15x7-10µm |

**Verrucaria degelii** R. Sant. has a thick, areolate, sub-gelatinous thallus ranging in color from brownish-black (sun form), to greenish (shade form); areoles with raised, black ridges around the edges; perithecia small, 0.1-0.2 mm in diameter, immersed in the thallus and visible as small dots from above; involucrellum cap-like or plate-like, not extending downward; excipulum pale; spores small, 7-10 X 4-7 µm.

In the shade form, *Verrucaria degelii* can be confused with *Verrucaria mucosa* as both have a greenish thallus and immersed perithecia. However, *V. degelii* will show numerous, dark-edged cracks in a developing pattern. Stress cracks may develop during drying with *V. mucosa* but these will not have black edges and usually will be in a random pattern. The sun form (dark thallus) shows some similarity to areolate forms of *Verrucaria ditmarsica* and *Verrucaria maura*, neither of which will have raised edges bordering the areoles as seen in *V. degelii*. In addition, the perithecia of *V. ditmarsica* and *V. maura* are, at least partly emergent and hemispherical.



Collection sites of *Verrucaria degelii*


*Composite drawing of thallus*

*Section of perithecium*

*Vrrucaria degelii*. Composite drawing of the characteristics of the thallus, perithecia shape, and perithecia structure.

| Scale bar | Form | Color | Texture |
|---|---|---|---|
| Thallus = 1.0 mm<br>Inset = 0.1 mm | Thick areolate | Black or greenish | Sub-gelatinous |

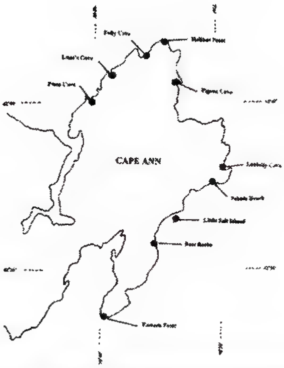
Section through perithecia showing immersion in the thallus, black, cap-like involucrellum and pale excipulum throughout.

| Scale bar | Shape | Perithecium Size | Spore Size |
|---|---|---|---|
| 0.1 mm | Immersed | Small<br>0.1 – 0.2 mm | Small<br>7-10x4-7μm |

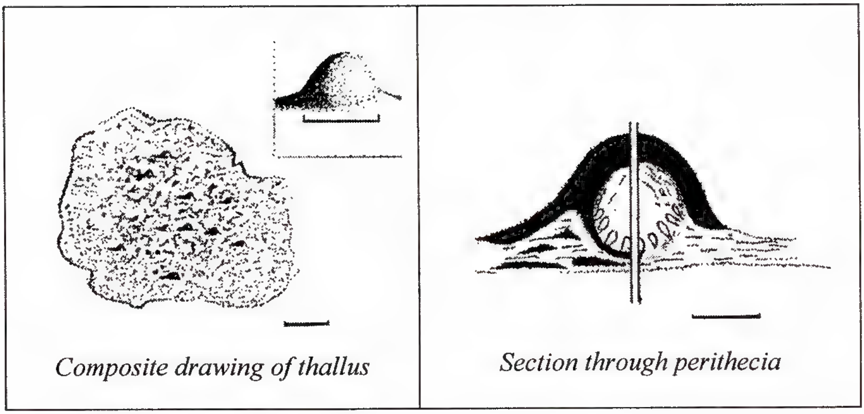
***Verrucaria ditmarsica*** Erichsen has a very thin, smooth (sometimes areolate, especially when dry), sub-gelatinous, pale brownish thallus that becomes transparent when wet and may be seen to contain black inclusions that often project through the surface as points that may coalesce to form short, often y-shaped or curved ridges, especially in the sun; perithecia small, 0.1-0.2 mm in diameter; involucrellum variable, wide-spreading, or when down-spreading, extending partially down the perithecium; excipulum variable, pale to completely dark below. Spores small, 7-10 X 4-7 μm.

This species is quite variable, usually smooth but becoming areolate when dry. It often appears black in exposed sunshine due to the many carbonaceous inclusions. These inclusions may simply be rounded or oblong dots, or they may coalesce into short, curved or y-shaped ridges that may appear above the surface. The perithecia are half immersed in the thallus and appear hemispherical. The involucrellum often spreads laterally, or it may extend downward to about the middle of the perithecial sac. The excipulum begins dark above and becomes pale or colorless below, although sometimes remaining dark throughout.

Some of these characteristics have been used to describe *Verrucaria erichsenii* Zschacke. The species was recognized by a ridged thallus and the lower half of the excipulum remaining dark. However, these characters overlap with those of *V. ditmarsica* and there seems to be no clear distinction between the two, a conclusion advanced by Anthony Fletcher (pers. comm.). *Verrucaria ditmarsica* and *Verrucaria erichsenii* are considered here to be conspecific.



Collection sites of *Verrucaria ditmarsica*



*Composite drawing of thallus*

*Section through perithecia*

*Verrucaria ditmarsica.* Composite drawing of the characteristics of the thallus, perithecia shape, and perithecia structure.

| Scale bar | Form | Color | Texture |
|---|---|---|---|
| Thallus = 1.0 mm<br>Inset = 0.2 mm | Thin with black dots or ridges | Pale brown to brown | Sub-gelatinous |

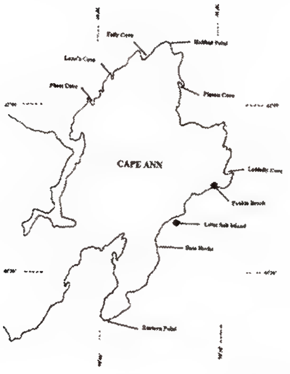
Section through perithecia showing on the left the wide-spreading involucrellum and brown excipulum and on the right the downward-spreading involucrellum and pale excipulum

| Scale bar | Shape | Perithecium Size | Spore Size |
|---|---|---|---|
| 0.1 mm | Hemispherical | Small<br>0.1 – 0.2 mm | Small<br>7-10x4-7µm |

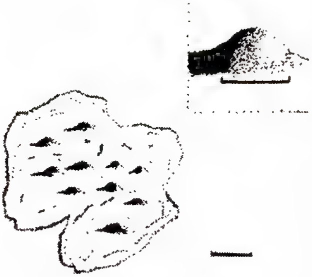
***Verrucaria halizoa*** Leighton has a thin, smooth, sub-gelatinous thallus, brown to somewhat olive-greenish in color, upper surface without points or ridges; perithecia large, 0.3-0.6 mm in diameter, brown and somewhat darker than the thallus, shiny, partially immersed in the thallus and dome-shaped; involucrellum thin, wide-spreading, with or without a clear gap between it and the excipulum; excipulum dark except for the bottom portion; spores small, 7-10 X 4-7 µm.

The smooth thallus of this species is similar to that of *Verrucaria mucosa* but the brownish color and dome-shaped perithecia clearly distinguishes it. This species shows little variation and should not be confused with any others. Very small *Hildenbrandia* sp., before it has assumed the reddish cast, might be similar in color to *V. halizoa*, but without perithecia. The thallus of *V. halizoa* is usually small, to 1.5 cm in diameter and sometimes surrounded by a darker hypothallus.

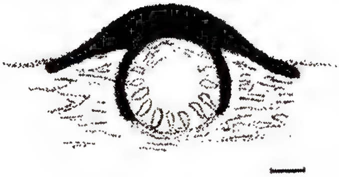
**Note:** The only confusion with this species apparently is its name. *Verrucaria microspora* auct. is neither a synonym nor a valid species, but rather a misapplied name by various authors. *Verrucaria microspora* Nyl. is a synonym for the smooth, shade form of *Verrucaria striatula* Wahlenb. (see Thomson 1997, page 644, under *V. striatula*). *Verrucaria microspora* Nyl. in Taylor (1982) = *Verrucaria halizoa* Leighton (see Gowan and Brodo 1988, page 323).



Collection sites of *Verrucaria halizoa*



*Composite drawing of thallus*



*Section of perithecia*

*Verrucaria halizoa*. Composite drawing of the characteristics of the thallus, perithecia shape, and perithecia structure.

| Scale bar | Form | Color | Texture |
|---|---|---|---|
| Thallus = 1.0 mm<br>Inset = 0.4 mm | Smooth | Olive to brown | Sub-gelatinous |

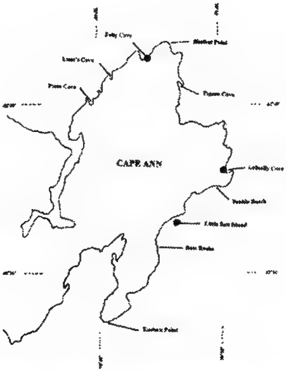
Section through perithecia showing wide-spreading and downward spreading involucrellum and dark excipulum, except for the basal portion.

| Scale bar | Shape | Perithecium Size | Spore Size |
|---|---|---|---|
| 0.1 mm | Dome-like | Large<br>0.3-0.6 mm | Small<br>7-10x4-7µm |

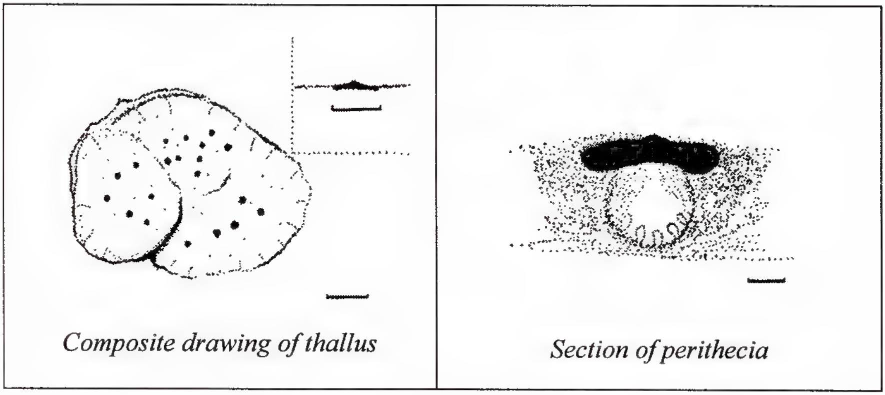
***Verrucaria mucosa*** Wahlenb. has a generally thick, shiny, sub-gelatinous thallus, green (shade form) to blackish-green (sun form) in color, upper surface without ridges, a white prothallus often present around the margins; perithecia small, 0.1-0.2 mm in diameter, immersed in the thallus and often seen only as black dots on the surface; involucrellum black, plate-like, not extending downward; exciplum pale; spores small, 7-10 X 4-7 µm.

*Verrucaria mucosa* is easily recognized in its shade form by the grass green color and smooth thallus. The sun forms are much darker and may appear nearly black in the field. The sun form thallus is smooth and shiny and may be mistaken for the black, crustose algae, *Ralfsia* sp. In addition, the thalli of *V. mucosa* tends to become greener in the winter and darker in the summer. It could be confused with the greenish, shade form of *Verrucaria degelii*; however, *V. degelii* will have areolate cracking with dark margins, while cracks, sometimes developing in

*V. mucosa* during drying, will not be black-edged. Whitish pits are sometimes seen in the thalli of both *V. mucosa* and *V. degelii* that result from detached perithecia.



Collection sites of *Verrucaria mucosa*



*Composite drawing of thallus*

*Section of perithecia*

*Verrucaria mucosa*. Composite drawing of the characteristics of the thallus, perithecia shape, and perithecia structure.

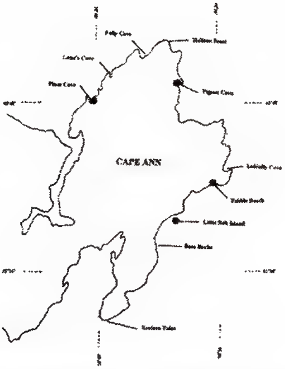
| Scale bar | Form | Color | Texture |
|---|---|---|---|
| Thallus = 1.0 mm<br>Inset = 0.5 mm | Thick and smooth | Green to black | Sub-gelatinous |

Section through perithecia showing immersion in the thallus, cap-like involucrellum and pale excipulum.

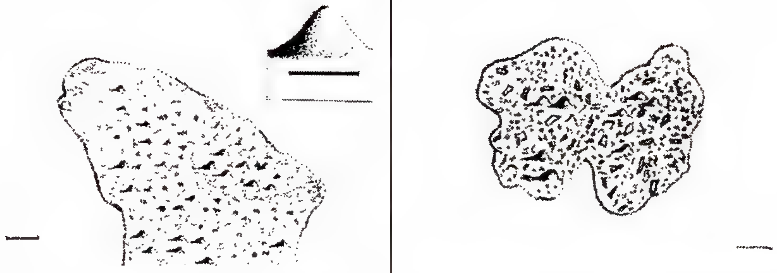
| Scale bar | Shape | Perithecium Size | Spore Size |
|---|---|---|---|
| 0.1 mm | Immersed | Small<br>0.1 – 0.2 mm | Small<br>7-10x4-7μm |

***Verrucaria striatula*** Wahlenb. has a variable, grass-green (shade form) to dark-green (sun form), sub-gelatinous thallus that becomes more transparent when wet, showing multiple black inclusions that may form irregular ridges that rise above the surface, especially when exposed to the sun; imbedded ridges (inclusions) are especially common near the margins of the thallus (best seen when wet); perithecia large, shiny, conical, or may become irregular in shape due to coalescing with emerging ridges, 0.3-0.6 mm in diameter; involucrellum not extending laterally, but extending downward nearly to the perithecial base; excipulum colorless at the base; spores small, 7-10 X 4-7 μm.

In the shade, *V. striatula* becomes grass green in color and the upper surface is generally smooth, except for the conical perithecia (Nylander's *Verrucaria microspora*). Ridges are developed within and may be seen by wetting the thallus. These ridges (inclusions) are especially common along the periphery of the thallus, seen, more or less, as radiating lines. The sun form becomes darker green as the inclusions rise to the surface and appear as broad, sometimes y-shaped ridges, many of which are flat-topped and table-like. Often these ridges coalesce with the perithecia, which may appear irregular in shape and even flat-toped. *Verrucaria amphibia* may appear similar, but it has cylindrical perithecia and tiny, narrow ridges. *Verrucaria ditmarsica* has smaller, hemispherical perithecia, very thin, brownish thallus, and, often, a wide spreading involucrellum.



Collection sites of *Verrucaria striatula*

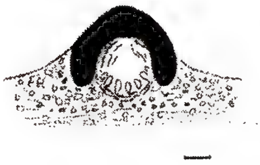


*Composite drawing of shade-form thallus*

*Composite drawing of sun -form thallus*

*Verrucaria. striatula* Composite drawing of the characteristics of the thallus, perithecia shape, and perithecia structure.

| Scale bar | Form | Color | Texture |
|---|---|---|---|
| Thallus = 1.0 mm<br>Inset = 0.6 mm | Shade-form: less defined with black perithecia<br>Sun-form: ridges short, angular, or branched, often flat topped | Shade-form: Grass green<br>Sun-form: greenish black | Sub-gelatinous |



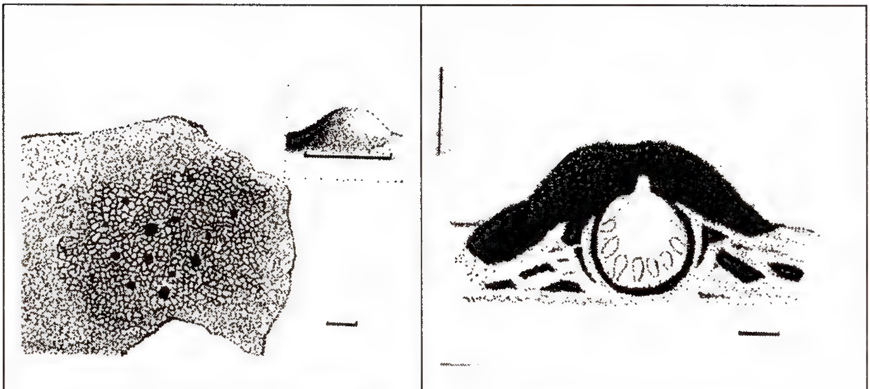
*Section of perithecia*

Section through perithecia showing downward spreading involucrellum and pale excipulum

| Scale bar | Shape | Perithecium Size | Spore Size |
|---|---|---|---|
| 0.1 mm | Conical | Large<br>0.3-0.6 mm | Small<br>7-10x4-7µm |

*Verrucaria maura* may be found in future studies.

***Verrucaria maura*** Wahlenb. is reported (Purvis, et al 1992) to have a variable, thin to thick, areolate, dull, brown to black thallus, the areoles flat, without raised margins, angular in shape, resembling mud cracks; upper surface roughened with tiny points, without ridges; perithecia large, 0.3-0.6 mm in diameter, half immersed in the thallus, wart-like; involucrellum wide spreading and extending downward to the bottom of the thallus; excipulum dark throughout; spores large, 12-18 X 7-10 µm.



*Composite drawing of thallus*

*Section of perithecium*

*Verrucaria maura*. Composite drawing of the characteristics of the thallus, perithecia shape, and perithecia structure.

| Scale bar | Form | Color | Texture |
|---|---|---|---|
| Thallus = 1.0 mm<br>Inset = 0.5 mm | Cracked and areolate | Black or dark brown | Non-gelatinous |

Section through perithecia showing extensively spreading involucrellum and black excipulum

| Scale bar | Shape | Perithecium Size | Spore Size |
|---|---|---|---|
| 0.1 mm | Wart-like, hemispherical | Large<br>0.3-0.6 mm | Large<br>12-18x7-10 µm |

**Acknowledgements**. The authors wish to express our appreciation to Drs. Anthony Fletcher, Irwin Brodo, and Alan Fryday for assistance in identifying and verifying species. We also thank various others who gave comments and suggestions on the manuscript.

## Literature Cited

Brodo, Irwin M., S. D. Sharnoff and S. Sharnoff. 2001. Lichens of North America. Yale University Press. New Haven.

Esslinger, Theodore L. and Robert S. Egan. 1995. A sixth checklist of the lichen-forming, lichenicolous, and allied fungi of the Continental United States and Canada. *The Bryologist* 98: 467-549.

Fink, Bruce. 1935. The Lichen Flora of the United States. 426 pp + 46 pl. University of Michigan Press, Ann Arbor.

Fletcher, Anthony. 1975. Key for the identification of British marine and maritime lichens I. Siliceous rocky shore species. Lichenologist 7: 1-52.

Gowan, Sharon P. and Erwin M. Brodo. 1988. The lichens of Fundy National Park, New Brunswick, Canada. The Bryologist 91: 255-325.

Purvis, O. W., B. J. Coppins, D. L. Hawksworth, P. W. James, and D. M. Moore (eds). 1992. The Lichen Flora of Great Britain and Ireland. Natural History Museum Publications and British Lichen Society. London. 710 pp.

Taylor, Ronald M. 1982. Marine Flora and Fauna of the Northeastern United States. Lichens (Ascomycetes) of the Intertidal region. NOAA Technical Report,

NMFS Circular 446. U.S. Department of Commerce. Washington, D.C.

Thomson, John W. 1997. American Arctic Lichens. II. The Microlichens. University of Wisconsin Press. Madison. 675 pp.

**Chart of diagnostic characteristics-The Thallus**

*Thallus Scale Bar = 1.0 mm; Inset Scale Bar = See species pages*

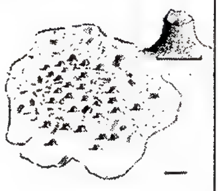
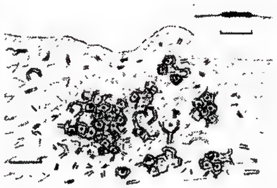
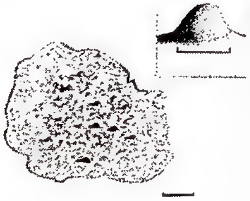
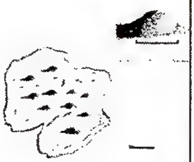
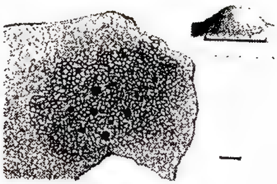
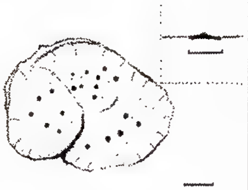
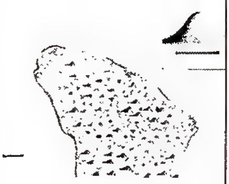
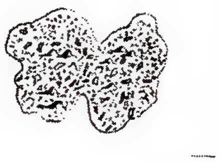
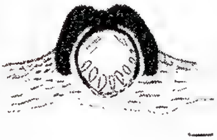
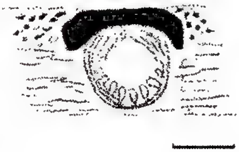
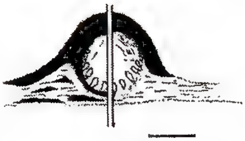
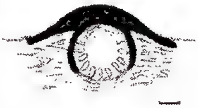
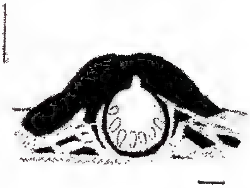
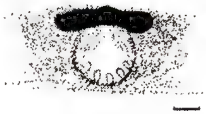
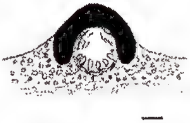
| | | |
|---|---|---|
| <br>**V. amphibia**<br>Smooth or ridged<br>Black ridges on green<br>Non-gelatinous | <br>**V degelii**<br>Thick areolate<br>Black or greenish<br>Sub-gelatinous | <br>**V. ditmarsica**<br>Thin with black dots or ridges;pale brown to brown;sub-gelatinous |
| <br>**V. halizoa**<br>Smooth<br>Olive to brown<br>Sub-gelatinous | <br>**V maura**<br>Cracked, areolate<br>Black or dark brown<br>Non-gelatinous | <br>**V mucosa**<br>Thick, smooth<br>Green to black<br>Sub-gelatinous |
| <br>**V. striatula (shade form)**<br>Smooth or ridged<br>Black ridges on green or green only<br>Sub-gelatinous | <br>**V. striatula**<br>**(sun form)**<br>More ridged<br>Less green<br>Sub-gelatinous | |

**Chart of diagnostic characteristics-The Perithecia**

*Perithecium size: Large = 0.3-0.6mm; Small = 0.1-0.2mm*
*Spore size: Large = 12-15x7-10µm; Small = 7-10x4-7µm*
*Scale Bar = 0.1 mm*

| | | |
|---|---|---|
| <br>**V. amphibia**<br>Cylindrical, flat topped<br>Large perithecium<br>Large spore | <br>**V degelii**<br>Immersed<br>Small perithecium<br>Small spore | <br>**V. ditmarsica**<br>Hemispherical<br>Small perithecium<br>Small spore |
| <br>**V. halizoa**<br>Dome-like<br>Large perithecium<br>Small spore | <br>**V maura**<br>Wart-like, hemispherical<br>Large perithecium<br>Large spore | <br>**V mucosa**<br>Immersed<br>Small perithecium<br>Small spore |
| <br>**V. striatula**<br>Conical<br>Large perithecium<br>Small spore | | |

# New State and County Mosses for Nebraska

**Robert F. Steinauer**

Recent collections by the author have resulted in new state and county moss records for Nebraska.

*Campylium stellatum* (Hedw.) C. Jens. Amblystegiaceae Nebraska, Rock County, T30N R17W SE ¼ NE ¼ Sec. 7, Sandhills wet meadow, 7 July 1999, *Steinauer* 534 (MO). Previously reported for Cherry County (Churchill & Steinauer 1999).

*Dicranum polysetum* Sw. Dicranaceae Nebraska, Cherry County, N 42° 50.834' W 100° 12.641', Niobrara Valley Preserve, rare on south side of Niobrara River. Margin of seep/marsh at base of north-facing slope. On fallen log, partial shade, 12 June 2002, *Steinauer* 1724 (MO). Apparently new for Nebraska.

*Fissidens adianthoides* Hedw. Fissidentaceae Nebraska, Garfield County, T24N R15W SE ¼ SE ¼ Sec.14, Margin of Sandhills fen. *Carex interior* zone, with *Aulocomnium palustre* and *Hypnum pratense*, 29 June 1999, *Steinauer* 845, (MO), Identification by Ron Purcell; Garfield County, T24N R15W near center of section 24, Sandhills sedge meadow, shallow peat (ca. 5 cm) over sandy loam, 13 June 2000, *Steinauer* 1015 (NEB); Garfield County, T24N R15W SE ¼ SW ¼ SW ¼ Sec. 25, shallow peat (5 – 8 cm), Sandhills wet meadow, 22 June 2000, *Steinauer* 1052 (NEB). New to Nebraska.

*Helodium blandowii* (Web. & Mohr) Warnst. Helodiaceae Nebraska, Sheridan County, N 42° 29.991' W 102° 16.817', forming mats on peat of mounded spring/seep, 9 July 2001, *Steinauer* 1601 (NEB); Loup County, Calamus River valley, T24N R20W NW ¼ NE ¼ Sec. 5, small sandhills fen adjacent to Calamus River, rare at base of *Carex prairea,* 26 Aug. 2000, Steinauer 1469 (MO). New to Nebraska.

*Hypnum lindbergii* Mitt. Hypnaceae Nebraska, Jefferson County, N 40° 04.703' W 97° 02.683', Steele City Canyon, uncommon in patches at upper end of fen, 28 May 2000, *Steinauer* 967, (MO, NEB). Previously collected in Keith County, *Kiener* 15659 (MO).

*Hypnum pratense* (Rabenh.) W. Kock *ex* Spruce Hypnaceae Nebraska, Garfield County, T24N R15W SE ¼ SE ¼ Sec. 14, *Carex interior/Thelypteris palustris* zone of Sandhills fen, 29 June 1999, *Steinauer* 841, (MO, NEB). Previously collected in Cherry County (Steinauer & Churchill, 1998).

*Meesia triquetra* (Richt.) Ångstr. Meesiaceae Nebraska, Garden County, approximately 2.1 km south of Crescent Lake, T20N R44W SW ¼ NE ¼ Sec. 33, very common with *Drepanocladus aduncus* on small sandhills fen

302 Third Street, Steinauer, NE 68441 - phone (402) 869-2202

within spring/seep marsh complex, head of Blue Creek, 8 Sept. 2000, *Steinauer* 1500 (MO, NEB). New to Nebraska.

*Pleurozium schreberi* (Brid.) Mitt. Hylocomiaceae Nebraska, Sioux County, T32N R56W E ½ NE ¼ NE ¼ Sec. 7, Gilbert Baker Wildlife Management Area, on fallen log approximately 1 m above intermittent stream, *Pinus ponderosa* forest of the Pine Ridge, 18 September 1999, *Steinauer* 744, (MO). Previously collected in Cherry County, *Churchill* 12500 (MO).

*Ptilium crista-castrensis* (Hedw.) De Not. Hypnaceae Nebraska, Sioux County, T32N R56W NE ¼ NE ¼ Sec. 7, Gilbert Baker Wildlife Management Area, fallen log approximately 0.5 m above seep at base of north facing bank, *Pinus ponderosa* forest of the Pine Ridge, 18 September 1999, *Steinauer* 736 (MO). Apparently new to Nebraska.

*Calliergonella cuspidata* (Hedw.) Loeske Amblystegieaceae, Nebraska, Cherry County, T28N R28W NW ¼ SW ¼ Sec. 26, Sandhills fen with *Menyanthes trifoliata*, 6 July 1998, *Steinauer* 352 (NEB); Garfield County, T24N R15W SE ¼ SE ¼ Sec. 14, peat of Sandhills fen, 30 June 1999, *Steinauer* 507 (MO); Brown County, Plum Creek Valley Wildlife Management Area, peaty wet meadow 42.42N 99.56W, 25 July 1999, *Steinauer* 601 (MO); Loup County, T24N R20W NE ¼ NE ¼ Sec. 3, peaty wet meadow of Calamus River, 25 August 2000, *Steinauer* 1454 (NEB). This species is relatively common on organic soils within the sandhills region of Nebraska.

## Literature Cited

Churchill, S.P. & R.F. Steinauer. 1999. Additional state and county mosses for the Great Plains. Evansia 16(1):13-15.

Steinauer, R.F. & S.P. Churchill. 1998. New state and county records for the Great Plains. Evansia 15:93-94.

# COLORADO BRYOLOGICAL HOT SPOTS

## 3. HIGH CREEK FEN

**William A. Weber[1] & Ronald C. Wittmann[2]**

Colorado has no true bogs, and most collections of wetland bryophytes have come from wet meadows, stream-banks, travertine deposits, willow carrs and fens. Only recently have fens been noted here for the occurrence of extraordinary assemblages of rare and disjunct mosses. Dr. David Cooper has initiated and developed the plant sociology and physico-chemical characteristics of Colorado fens, and has awakened us to their bryological potential. His work added a significant number of Colorado records for wetland mosses. We have benefitted immensely from the help we have received from Richard Andrus (*Sphagnum*) and from Lars Hedenäs, Curator of bryophytes at the National Museum of Natural History in Stockholm, whose work with the Amblystegiaceae in Scandinavia has helped us to refine our concepts, which in America for a long time, unfortunately, have been overly simplistic.

It is now well known that one of the great fens of Colorado, High Creek Fen, 9,500 ft. alt., ten miles south of Fairplay, in South Park, is a haven for relictual populations of vascular plants. Cooper (1991, 1995, 1997) has elucidated the characteristics and higher plant floristics of the fen. Among the most exciting members of the vascular flora are *Ptilagrostis porteri, Primula egaliksensis, Kobresia simpliciuscula* and *K. myosuroides, Carex scirpoidea, Trichophorum pumilum,* and *Senecio pauperculus.* High Creek Fen is a remnant of what must have been a great complex of fens that existed in South Park before the area was scraped for mountain peat and the water rights sold to Denver suburbs. Fortunately the fen is now protected by the Nature Conservancy, and restoration of the margins areas denuded of its thin layer of peat are proceeding.

High Creek Fen receives its ground water from springs on a low mountain to the west; it is classified as an extremely rich fen. Its major part is a wet meadow dominated by *Carex scirpoidea, Trichophorum pumilum,* and *Kobresia simpliciuscula.* The center of the fen contains an interesting vascular flora including *Salix candida, S. myrtillifolia,* and *S. serissima, Betula glandulosa* and *B. glandulosa x B. fontinalis* (possibly the latter parent is extinct there). There is a narrow line of stunted spruces that may prove to be of biogeographic significance. These are presently identified as *Picea pungens*. However, the altitude, 9,400 feet, is unusually high for the species, and while the twigs are

[1] University of Colorado Museum, Campus Box 265, Boulder, CO 80309-0265
[2] National Institute of Standards and Technology, Boulder, CO.

glabrous, and the cones large, as they should be in *P. pungens*, the needles are unusually short, curved, and not at all pungent. It would be useful to obtain a biogenetic analysis of these plants.

The mosses have not suffered at all from the current severe drought which has parched so much of the region in 2002, but the fen has become more accessible. There are still places in the otherwise merely moist meadows where an unwary visitor can break through the mattress at least up to ones upper thighs. Scattered shallow pools contain two species of *Utricularia*, and are commonly filled with dense submerged stands of *Scorpidium scorpioides* and *Pseudocalliergon turgescens.* The edges of the ponds, where small boulders are exposed by low water, are covered by *Cratoneuron filicinum* and *Palustriella falcata.* The narrow, steep-sided channels that fill these pools support occasional dense colonies of *Distichium inclinatum*, *Catoscopium nigritum, Amblyodon dealbatus, Pohlia greenii,* and a few clumps of *Meesia longiseta.*

The bryophytes collected in High Creek Fen on two visits in 2002 are tabulated below. The flora is not very diverse (only 21 species), and there are no species of *Sphagnum*. *Catoscopium* here evidently reaches its southern limit in North America.

*Amblyodon dealbatus*
*Aulacomnium palustre*
*Bryum pseudotriquetrum*
*Campylium stellatum*
*Catoscopium nigritum*
*Conardia compacta*
*Cratoneuron filicinum*
*Distichium inclinatum*
*Drepanocladus aduncus*
*Meesia longiseta*
*Meesia uliginosa*
*Palustriella falcata*
*Pohlia greenii*
*Pohlia nutans*
*Pohlia drummondii*
*Pseudocalliergon turgescens*
*Scorpidium cossonii*
*Scorpidium scorpioides*
*Tomenthypnum nitens*
*Pellia endiviifolia*

## Literature Cited

Cooper, D. J. 1991. Additions to the peat-land flora of the Southern Rocky Mountains: Habitat descriptions and water chemistry. *Madroño* 38: 139-143.

Cooper, D. J. 1996. Water and soil chemistry, floristics, and phytosociology of the extreme rich High Creek Fen, in South Park, Colorado, U.S.A. *Can. J. Bot.* 74: 1801-1811.

Cooper, D. J. 1997. A montane *Kobresia myosuroides* fen community type in the Southern Rocky Mountains of Colorado, U.S.A. *Arctic and Alpine Research* 29: 300-303.

# Additions to the bryoflora of Broxton Rocks Ecological Preserve, Coffee County, Georgia

**William R. Buck**[1] **& Ronald A. Pursell**[2]

The Blomquist Foray for 2003 was held at the Broxton Rocks Ecological Preserve in Coffee County, Georgia, 9 miles NE of Broxton, on 7–9 February. The foray was led by Frankie Snow of South Georgia College in Douglas, an authority on the geology, anthropology and plants of the preserve. Broxton Rocks, an outcropping of Miocene-age sandstone, is a unique geologic feature of the Coastal Plain of Georgia. The bryoflora has been catalogued by Griffin et al. (1994) and discussed by Griffin and Snow (1998). The following species were added to the bryoflora during this foray. Collections made by Buck are deposited in NY, while those collected by Pursell are deposited in MO.

***Archidium alternifolium*** (Hedw.) Schimp. – open, moist soil, vicinity of Rock Falls along Rocky Creek, 31°43'57"N, 82°51'14"W, *Buck 43618*, *43627*, *43634*, *43636*, *43637*; in extensive dissected outcrops, vicinity of Arch Cave, 31°44'29"N, 82°51'33"W, *Buck 43646*, *43649*; vicinity of West Branch of Rocky Creek, 31°44'36"N, 82°51'52"W, *Buck 43656*, *43665*, *43668*, *43681*. This species is quite similar to the previously reported *A. ohioense* Müll. Hal., but differs in the paroicous inflorescences.

***Archidium donnellii*** Austin – open, moist soil, vicinity of Rock Falls along Rocky Creek, 31°43'57"N, 82°51'14"W, *Buck 43639*; in extensive dissected outcrops, vicinity of Snow's Glade, 31°43'58"N, 82°51'31"W, *Buck 43643*. This is an autoicous species with serrulate leaves.

***Archidium minus*** (Renauld & Cardot) Snider – open, moist soil, vicinity of West Branch of Rocky Creek, 31°44'36"N, 82°51'52"W, *Buck 43683*. This is the only North American species of *Archidium* that is annual, rather than perennial, and the only synoicous species as well.

***Fabronia ciliaris*** (Brid.) Brid. – on trunk of tree and on sandstone, vicinity of West Branch of Rocky Creek, 31°44'36"N, 82°51'52"W, *Buck 43663*, *43675*.

***Fissidens osmundioides*** Hedw. – dripping sandstone cliff face in extensive dissected outcrops in mesic oak forest, vicinity of Rock Falls along Rocky Creek, 31°43'57"N, 82°51'14"W, *Pursell 12383*.

---

[1] Institute of Systematic Botany, New York Botanical Garden, Bronx, NY 10458-5126, bbuck@nybg.org

[2] Department of Biology, 208 Mueller Laboratory, The Pennsylvania State University, University Park, PA 16802, rap10@psu.edu

***Grimmia pilifera*** P. Beauv. – shaded sandstone boulder at base of cliff in extensive dissected outcrops in mesic oak forest, vicinity of West Branch of Rocky Creek, 31°44'36"N, 82°51'52"W, *Buck 43671.*

***Syrrhopodon parasiticus*** (Brid.) Besch. – on branches of *Magnolia grandiflora* below a sandstone cliff in extensive dissected outcrops in mesic oak forest, vicinity of West Branch of Rocky Creek, 31°44'36"N, 82°51'52"W, *Buck 43658, Pursell 12394.* This is the second report of this species for Georgia, the first report having been made by Reese (1959).

**Acknowledgments**: We thank Frankie Snow for arranging for our access to Broxton Rocks, as well as leading us into the site. Molly McMullen, once again, made the arrangements for the Blomquist Foray, for which we are grateful.

## Literature Cited

Griffin, D., F. Snow & W. R. Buck. 1994. The bryophytes of Georgia's sandstone outcrops: I. The Broxton Rocks Ecological Preserve. Evansia 11: 81–87.

Griffin, D. & F. Snow. 1998. Broxton Rocks Ecological Preserve: Bryophyte refugium of South Georgia. Tipularia 13: 23–28.

Reese, W. D. 1959. *Syrrhopodon parasiticus* in the southern United States. The Bryologist 62: 182–186.

# Mosses of Semiarid Steppes Bitterroot Valley, Ravalli County, Montana

Judy A. Hoy[1] & Joe C. Elliott[2]

Mosses of the semiarid steppes on the east side of the Bitterroot Valley, Ravalli County and other western Montana grasslands have been largely unstudied; however, research of similar Palouse Prairie grasslands in British Colombia indicates that rare mosses are present in these diminishing habitats. McIntosh (1989) found several mosses with disjunctions between western North America and arid regions of Eurasia in semiarid steppe habitats of British Colombia. Eckel et al (1997) reported *Pseudocrossidium obtusulum*, a new species for Montana, from the semiarid steppes of the Bitterroot Valley, Montana.

Prior to settlement, the east side of the Valley was mostly covered with Palouse Prairie communities dominated by bluebunch wheatgrass and big sagebrush. Lying in the rain shadows of the Bitterroot Mountains to the west, severely limits the amount of annual precipitation to 9 or 10 inches. Much of the native vegetation on the east side of the Bitterroot Valley has been substantially altered or destroyed by agricultural practices, introduction of non-native grasses and forbs, and residential subdivisions.

About half of the 100-acre area investigated for this study is composed of relatively pristine Palouse Prairie vegetation, and half has been plowed or is hay field or pasture. Approximately 40 acres, the Willoughby Bluffs Natural Area, is protected by a Nature Conservancy easement. The dissected topography and soils of the study area include several outcrops of volcanic ash, composed of compacted microscopic glass shards. Cryptogamic crusts composed of bryophytes, lichens, fungi and cyanobacteria cover much of the soil between bunchgrasses. A perennial stream with a riparian zone of black cottonwoods and shrubs drains the project area. Scattered ponderosa pines are present on moister microsites.

We have identified the following mosses from the Ravalli County study area. Nomenclature generally follows Anderson et al (1990) and Zander (1993). Species that appear to be new for Montana are denoted with an asterisk. Noteworthy collections are deposited at the University of Montana Herbarium (MONTU), Missoula, Montana, or the Clinton Herbarium (BUF), Buffalo, New York. J.A. Hoy made all collections.

[1] 2858 Pheasant Lane, Stevensville, Montana 59870
[2] Conservation Biology Research Ltd., 3919 Lincoln Road, Missoula, Montana 59802

*Amblystegium serpens* var. *juratzkanum* (Schimp.) Rau & Herv. (#161). Shaded, dead tree trunk.

*Amblystegium serpens* var. *serpens* Schimp. in B.S.G. (#271). Shaded, moist soil.

*Barbula unguiculata* Hedw. (#312A, BUFO). Volcanic ash deposit.

*Brachythecium albicans* (Hedw.) Schimp. in B.S.G. (#255A). Partially shaded soil.

*Brachythecium velutinum* (Hedw.) Schimp. in B.S.G. (#269). Shaded soil.

*Bryum argenteum* Hedw. (#258C). Soil in full sun.

**Bryum dichotomum* Hedw. (#306B, BUFO). Soil on a vertical south-facing bank of an irrigation canal just above the water line, with *Pseudocrossidium obtusulum*. Seville Flowers also collected this moss (#6661 and #10105, COLO) near Mission Fall, Lake County, Montana.

*Bryum caespiticium* Hedw. (#280). Partially shaded soil.

*Bryum capillare* Hedw. (#303). Partially shaded soil.

*Ceratodon purpureus* (Hedw.) Brid. (#197). Partially shaded soil.

*Coscinodon calyptratus* (Hook.) C. Jens. (#337, BUFO and MONTU). Rock in full sun.

*Desmatodon heimii* (Hedw.) Mitt. (#261, BUFO). Vertical volcanic ash outcrops in shady areas. Known from two collection in Cascade County, Montana (Williams 1902).

*Didymodon acutus* (Brid.) Saito (#326A, BUFO). Soil in dryland sagebrush habitat.

*Didymodon brachyphyllus* (Sull. in Whipple & Ives) Zand. (#153, BUFO). Shady areas of vertical volcanic ash outcrop, nearly always with *Tortula muralis* . Reported from Glacier National Park, Montana (Hermann 1969).

*Didymodon rigidulus var. gracilis* (Schleich. ex Hook. and Grev.)Zand. (#326A, BUFO). Soil in dryland sagebrush habitat.

Didymodon vinealis (Brid.)Zand.(#275B, BUFO). Soil and volcanic ash.

*Encalypta rhaptocarpa* Schwaegr. (#275A). Partially shaded rock.

*Encalypta vulgaris* Hedw. (#515). Shaded, moist soil.

*Eurhynchium pulchellum* (Hedw.) Jenn. (#275D). Partially shaded soil.

*Fissidens bryoides* Hedw. (#519, MONTU). Shady moist soil.

*Funaria hygrometrica* Hedw. (#306A). Partially shaded, seasonally moist soil.

*Grimmia anodon* B.S.G. (#307, BUFO). Soil in full sun.

*Grimmia plagiopodia* Hedw. (#309, BUFO). Volcanic ash outcrop in full sun.

*Grimmia pulvinata* (Hedw.) Sm. (#150, BUFO). Rock in full sun.

*Grimmia tenerrima* Ren.& Card. (#307, BUFO). Rock in full sun.

*Hypnum revolutum* (Mott.) Lindb. (#521). Shaded rock.

*Leptobryum pyriforme* (Hedw.) Wils. (#516). Moist, shaded soil.

*Orthotrichum affine* Brid. (#307D). Partially shaded dead wood.

*Orthotrichum laevigatum* Zett. (#307D). Dry rock in full sun.

*Orthotrichum pumilum* Sw. (#512, MONTU). Trunks and branches of cottonwoods.

*Orthotrichum speciosum* var. *speciosum* Nees ex Sturm (#371). Rocks and wood.

*Phascum cuspidatum* Hedw. (#258A, BUFO and MONTU). Soil, fruits profusely in spring.

*Physcomitrium hookeri* Hampe. (#319, BUFO and MONTU). Bare soil in valley bottoms.

*Pohlia nutans* (Hedw.) Lindb. (#255D). Soil and duff.

*Polytrichum juniperinum* Hedw. (#253E). Soil under sagebrush.

*Polytrichum piliferum* Hedw. (#254E). Soil under sagebrush.

*Pseudocrossidium obtusulum* (Brid. ex Schrad.) Zand. (#306D, BUFO). Soil on the south facing vertical side of an irrigation canal. McIntosh (1989) reported *P. revolutum* (Brid. in Schrad.) as new for Washington and "was one of the most frequently encountered taxa in the steppe, both in British Columbia and in Washington". According to Eckel et al. (1997), *P. revolutum*, has been excluded from the North American flora and is actually *P. obtusulum.*

*Pterigynandrum filiforme* Hedw. (#520). Shaded moist rock and wood.

*Pterygoneurum ovatum* (Hedw.) Dix. (#193,BUFO). Soil in full sun.

**Pterygoneurum subsessile* (Brid.) Jur. (#312C, BUFO). Cryptogamic crust in sagebrush habitat. J. Hoy collected this moss at several other sites in Ravalli County and in Madison, Silverbow, and Stillwater counties, Montana.

*Rhytidiadelphus triquetrus* (Hedw.) Warnst. Partially shades soil under sagebrush.

*Saonia uncinata* (Hedw.) Loeske (#160B). Soil over rock in shaded areas.

*Schistidium apocarpum* (Hedw.) B. and S. in B.S.G. (#373). Partially shaded rock.

**Tortula bartramii* Steere in Grout (#311, BUFO and MONTU). Volcanic ash outcrops. Previously reported from Idaho, Colorado, Arizona, New Mexico, and California (Lawton 1971).

**Tortula muralis* Hedw. (#151, BUFO and MONTU). Volcanic ash outcrops. A significant range extension from previous stations in British Columbia, California and Southeastern United States. This moss usually grows on walls and stones that contain lime. Its habitat in the Bitterroot Valley is vertical volcanic ash outcrops, similar to a wall but not calcareous.

*Tortula norvegica* ( Web.) Wahlenb. ex Lindb. (#280C, BUFO). Volcanic ash soil in shady gullies. Previously reported from Glacier National Park, Montana (Hermann 1969).

*Tortula papillosissima* (Coppey) Broth. in Engl. and Prantl. (#321A, BUFO). Soil in sagebrush habitat on the hottest and driest sites.

*Tortula ruralis* (Hedw.) Gaertn. (#299B). Soil and duff.

**Acknowledgements:** We thank Patricia M. Eckel of the Clinton Herbarium and Buffalo Society of Natural Sciences, Buffalo, New York for aide in species identification.

## Literature Cited

Anderson, L.E., H.A. Crum, and W.R. Buck. 1990. List of mosses of North America North of Mexico. The Bryologist 93(4): 448-499.

Eckel, P.M., J. A. Hoy, and J. C. Elliott. 1997. *Pseudocrossidium obtusulum* (Pottiaceae, Bryopsida) New to Montana with a key to North American species in the genus. Great Basin Naturalist 57(3), 259-262.

Lawton, E.1971. Moss Flora of the Pacific Northwest. Hattori Botanical Laboratory. Nichinan, Miyazaki, Japan.

Hermann, F.1969. The bryophytes of Glacier National Park, Montana. The Bryologist 72: 358-376.

McIntosh, T.1989. Bryophyte records from the semi-arid steppe of northwestern North America, including four species new to North America. The Bryologist 92(3): 356-362.

Williams, R. S.1902. A preliminary list of Montana mosses. Bulletin of the New York Botanical Garden 2:351-380.

Zander, R.H.1993. Genera of the Pottiaceae: Mosses of harsh environments. Bulletin of the Buffalo Society of Natural Sciences Vol. 32. Buffalo, New York.

## Guide to contributors to *EVANSIA*

The aim of *Evansia* is to provide a vehicle for the presentation and exchange of useful information on North American bryophytes and lichens. Articles are frequently popular in nature rather than technical and are intended to teach and inform both amateurs and professionals. The articles include, but are not restricted to, announcements of and reports on forays and meetings, presentations of techniques and aids for studying and curating lichens and bryophytes, and reports on local floras. Checklists and papers documenting new regional, state, or county records must include voucher specimens (collector and collection number) and an indication of where the specimens are deposited or a literature reference.

*Evansia* is published with the aid of desktop publishing software and manuscripts can be e-mail attachments (see below) or submitted on computer diskette. The diskette must be IBM compatible (any size) with the author's name, manuscript file name, and word processing software indicated on the disk. Most word processing files can be converted with little effort however an ASCII .txt copy should be sent if you are not using a standard word processor or if the file must be converted from an Apple software.

Manuscripts and correspondence may also be submitted by e-mail to the address listed below. The word processed document should be an attachment to a message. After the manuscript has been successfully received it will be acknowledged by e-mail. Please note that if you are sending ASCII text rather than an attachment an original copy of the manuscript must also be sent to the Editor. At this time images can still be a problem if sent by e-mail. A good quality copy of any illustration should also be mailed.

**IMPORTANT:** Authors should not spend time elaborately formatting their manuscript and should avoid numerous font changes, using footnotes, or other special features. When the manuscript is formatted for *Evansia* most of this work will have to be removed. Note that *Italics*, **bolding** and underlining must be included where appropriate. See recent copies of *Evansia* for style and highlighting of similar manuscripts.

**Manuscripts should be sent to the Editor:**

Robert E. Magill, Missouri Botanical Garden
P.O. Box 299, St. Louis, MO 63166-0299.

e-mail: bob.magill@mobot.org Phone (314) 577-5161. Fax (314) 577-0830

EVANSIA
Bryology Laboratory
Missouri Botanical Garden
P.O. Box 299
Saint Louis, MO 63166-0299 USA

NON-PROFIT ORG.
U.S. POSTAGE
PAID
ST. LOUIS, MO
PERMIT NO. 3566

RICHARD C. HARRIS
NEW YORK BOTANICAL GARDEN
BRONX NY 10458-5126

LUESTE
LIB
JUL 2
BOTANICAL GARDEN

XE
.V3
v.20
#3

# EVANSIA

Volume 20 Number 3

**A Catalog and Brief History of the Lichen Flora of Alabama**
Curtis J. Hansen & John D. Freeman 59

**The Taxonomic Status of *Fissidens clebschii***
Ronald A. Pursell 102

***Grimmia bernoullii* Mueller Hal. in the United States**
William A. Weber, Ronald C. Wittmann,
and Richard Worthington 104

[illegible]
LIBRARY
[illegible] 2003
[illegible]

© August, 2003 by the American Bryological and Lichenological Society

Editor:

Robert E. Magill
Bryology Laboratory
Missouri Botanical Garden
P.O. Box 299
Saint Louis, Missouri 63166-0299
U.S.A.

FAX 314-577-9594

e-mail bob.magill@mobot.org

ISSN 0747-9859

*Evansia* volume 20, number 2 was mailed on 26 June 2003

# .A Catalog and Brief History of the Lichen Flora of Alabama

**Curtis J. Hansen & John D. Freeman**

**ABSTRACT** *A catalog of the lichens of Alabama obtained primarily from literature reports is presented. After adjusting for synonyms and misidentifications the lichen flora of Alabama includes at least 577 epithets (562 species, 10 varieties, and 5 subspecies across 174 genera). A short physical description of Alabama and a brief history of lichenological research in the state are also included.*

## DESCRIPTION OF THE STATE OF ALABAMA

The state of Alabama is located in the southeastern United States and covers approximately 133,900km$^2$ (51,700 mi$^2$). The state is situated mainly between 85° 00' and 88° 30' west longitude and between 30° and 35° north latitude and ranges in elevation from 0 m at the Gulf of Mexico to just over 733 m (2400 ft) at the top of Cheaha Mountain. Alabama became the 22nd state and was first admitted to the United States in 1819.

Alabama is uniquely situated at the convergence of several major physiographic regions that help to create diverse habitats and soil types which lead to a rich and diverse flora. Most of the southern and western areas of the state are part of the East Gulf Coastal Plain Province which represents the exposed portion of the continental shelf and is composed of sedimentary deposits of Cretaceous age or younger (Sorrie & Weakley 2001). Within the Coastal Plain Province of Alabama is a unique band of rich, prairie-like soil known as the Black Belt region because of its characteristically dark colored soil. It begins in east central Alabama, stretches westward across the state and finally arcs toward the northwest. The Black Belt roughly parallels a distinct interface between the flatter Coastal Plain and the more mountainous, usually rocky Piedmont Plateau Province. Beginning in east-central Alabama is the Piedmont Plateau Province, a raised upland of disordered igneous and metamorphic rocks. Continuing to the northwest is the Valley and Ridge Province, a series of ridges and valleys aligned in a northeasterly direction. These valleys and ridges are Paleozoic in age and developed on sandstone, shale, limestone and dolomite (Johnston 1930). The Cumberland Plateau is a tilted uplift developed on Pennsylvanian rocks and valleys of older Paleozoic dolomite and limestone. It has an average elevation of

Biological Sciences Department and Herbarium (AUA), Auburn University, Auburn, Alabama 36849, hansecj@auburn.edu

457 m (1500 ft) and stands higher than any of the other adjoining provinces (Johnston 1930) Finally, in the northwest corner of the state is the Interior Low Plateau, which is characterized by rolling uplands, numerous sinks and springs, and southward-flowing streams with cliff-like walls and steep limestone cliffs (Johnston 1930).

From the mountainous regions in the north to the gulf coast 300 miles to the south, Alabama enjoys a diverse climate that is characterized as humid-temperate. The long north-south axis of the state creates four distinct seasons in the northern part of the state, and near tropical climates on the southern coasts (Carter & Seaquist 1984). Relatively uniform summer temperatures average near 80-82 °F (27-28 °C) statewide, while the average January temperature is 41 °F (5 °C) in the north and 51 °F (10 °C) in the south (Carter & Seaquist 1984). While severe cold weather is rare and below-freezing temperatures seldom last more than 48 hours Alabama does receive an average of 1-2 inches of snow in the north but only infrequent dustings in the south (Evans 1999). The summer temperatures routinely rise into the 90s (°F) which, when combined with similar high measures of relative humidity, lead to "hot & muggy" weather from late May to September. Alabama averages approximately 137 cm (54 in) of rain a year with higher amounts recorded near the coast. The humidity and rainfall can be largely attributed to the state's proximity to the Gulf of Mexico which sends large amounts of moisture over the state (Evans 1999).

## A REVIEW OF LICHENOLOGICAL RESEARCH IN ALABAMA

The study of lichens in Alabama began before 1850 with the pioneering work of Thomas M. Peters and John F. Beaumont. By the early 1850s, Peters, a lawyer from Lawrence County, Alabama, had made good progress in studying lichens of the state, was assisting Moses A. Curtis with cryptogamic studies, and began corresponding with Edward Tuckerman and Henry W. Ravenel (Haygood 1987). Beaumont, a school teacher, met Peters in 1852, became enthused with the study of lichens, and likewise became a correspondent of both Tuckerman and Ravenel (Peters 1886). The results of these early collection efforts by Peters and Beaumont led to the first documentation and inclusion of Alabama lichen specimens in the third fascicle of Ravenel's exsiccati, completed in 1855 (Haygood 1987), and in Tuckerman's (1858) North American Lichen Supplement. Enthusiastic collecting by Peters and Beaumont continued for many years and numerous Alabama records were included in many of Tuckerman's later works (see Tuckerman 1872, 1882, 1888).

Other late-19th century lichen collectors in Alabama included Franklin S. Earle and Charles F. Baker who collected lichens around Lee County in east Alabama, and Charles T. Mohr who took specimens mainly from Baldwin and Mobile

Counties in south Alabama (Mohr 1901). Fifty years of lichen collecting in Alabama primarily by Peters, Beaumont, Baker, Earle, and Mohr, was summarized and documented by Mohr (1901) in his monumental work treating the flora of Alabama which, incidentally, is the most recent state-wide treatment of lichens. After this publication lichen collecting in Alabama dropped dramatically for many years.

Beginning in the 1920s and continuing to the present, there have been only a handful of workers who have done substantial lichen collecting in Alabama. Beginning in the 1920s, the respected bryologist and lichenologist Alexander W. Evans spent his winters near Mobile, Alabama, collecting many interesting lichens (R. C. Harris, pers. comm.). During this same time Wolfgang Wolf, a Benedictine monk and respected botanist, collected a number of lichens from Cullman County and other areas in north central Alabama. By the 1950s, Mason E. Hale, Jr. had begun collecting lichens in Alabama. Also in the 1950s, Herbert A. McCullough, of Samford University in Birmingham, Alabama, collected many lichens and documented the macrolichen flora of two major physiographic provinces in the state (see McCullough 1964, 1967). He was also co-author of the name *Parmelia alabamensis* (Hale & McCullough 1968). In the mid-1970s, one of McCullough's graduate students took up the subject of lichenology and completed a master's thesis focusing on the macrolichens of Alabama's Black Belt region (Embry 1977). In 1973, Gareth Morgan-Jones came to Auburn University with experience and expertise in pyrenolichens, having collected and studied lichens in England and Canada. However, Morgan-Jones' primary research quickly shifted to microfungi, especially ascomycetes, for which he is now much renowned. Beginning in the late-1960s and continuing to the present, Richard C. Harris has collected much in Alabama. Together with William R. Buck, Harris has made many novel lichen discoveries in the state. While working on documenting the bryophytes of Alabama in the 1980s, Frank D. Bowers also collected a number of lichens from the state (F. D. Bowers, pers. comm.). Over the past decade, Alvin R. Diamond, a botanist and prolific collector based at Troy State University, Troy, Alabama, has collected many lichen specimens mainly throughout the southeastern part of the state.

With a fairly long, albeit inconsistent, record of lichen collecting in Alabama there are few extant specimens housed at in-state herbaria. Pre-20th century collections housed at Auburn University were destroyed by fire (Hansen 2003), and currently the Freeman Herbarium (AUA) contains approximately 400 lichen specimens. The University of Alabama (UNA) houses approximately 500 lichen specimens, including important 19th century collections by Peters. They are contained in 6 volumes approximating 300 specimens. Collections by Evans were originally sent to his home institution at Yale (YU), and while some collections still remain, his *Cladonia* collections were transferred to US and others sent to

FH, MICH, and NY (R. C. Harris, pers. comm.). Upon retirement, McCullough sent his important Alabama lichen collection to Philipps University in Marburg, Germany (MB). Fortunately, he also sent many of his duplicates to US. Lichen collections taken by Harris and Buck are housed mainly at NY. Many collections made by Bowers are housed and available at the University Of Alabama (UNA). Furthermore, collections made by Diamond remain in-state and are housed at Troy State University (TROY), where the total lichen specimens number around 800. While various student collections have also increased the number of in-state specimens the overall total remains low.

In an effort to further our understanding of the lichen diversity in Alabama this catalog of lichens and lichenicolous fungi has been compiled based mainly on reports in the literature. The literature search has included published papers, monographs, books, and unpublished theses. Richard C. Harris generously provided many lichen records from his personal collections housed mainly at Michigan State University (MSC) and NY. Additional records and distribution locations for Alabama specimens were obtained from inquiries to the following herbaria: ASU, BRY, FH, H, MB, MICH, MIN, MSC, NY, TUR, and US. Additional information was obtained by visits to the following in-state herbaria: AUA, TROY, and UNA. While much research has gone into this list, it is by no means comprehensive. Other Alabama reports, old and new, published and unpublished, including herbaria reports are certain to emerge. It is hoped that the production of this list will serve as a baseline of knowledge and stimulus which will lead to an increased interest in lichen collecting and research in Alabama and across the southeastern U.S. After correcting for synonyms and misidentifications the list includes 577 epithets comprising 562 species, 10 varieties, and 5 subspecies in 174 genera.

## Lichen Types from Alabama

The following 18 taxa have their type collection locality in Alabama. Invalid names are represented in italics and accepted names in small caps.

*Baeomyces absolutus* Tuck. =DIBAEIS ABSOLUTA (Tuck.) Kalb & Gierl
*Biatora petri* Tuck. =LECIDEA LURIDA (Ach.) DC.
*Collema laciniatum* Nyl. =COLLEMA TEXANUM Tuck.
EPHEBE SOLIDA Bornet
*Graphis beaumontii* Tuck. =GRAPHIS INSIDIOSA (C. Knight & Mitten) Hook. f.
*Graphis scolecitis* Tuck. =GRAPHINA SCOLECITIS (Tuck.) Fink
LECIDEA MAMILLANA Tuck.
*Pannaria petersii* Tuck. =PLACYNTHIUM PETERSII (Nyl.) Burnham
*Pannaria stenophylla* Tuck. =PLACYNTHIUM STENOPHYLLUM (Tuck.) Fink

*Parmelia alabamensis* Hale & McCull. =CANOPARMELIA ALABAMENSIS (Hale & McCull.) Elix
*Parmelia dentella* Hale & Kurok. =HYPOTRACHYNA DENTELLA (Hale & Kurok.) Hale
PHAEOGRAPHINA EXPLICANS Fink
*Pyrenula pachycheila* Tuck. var. *thelomorpha* Tuck. =PYRENULA THELOMORPHA Tuck.
*Rinodina thomae* Tuck. =BUELLIA MAMILLANA (Tuck.) W. A. Weber
*Synalissa melambola* Tuck. =METAMELANEA MELAMBOLA (Tuck.) Henssen
USNEA EVANSII Motyka
XANTHOPARMELIA ISIDIASCENS Hale
XANTHOPARMELIA NEOTARACTICA Hale

## COLLECTORS OF ALABAMA LICHENS

Historically, lichens have generally received sporadic attention by botanists and other workers in and out of the state. The rich, prominent macrolichen flora often attracts collectors and is better documented than the poorly known, sometimes difficult crustose lichen flora. The following list of individuals who have collected lichens from Alabama was culled mainly from literature sources and queries to the herbaria listed previously.

Anderson, R. A.
Baker, C. F.
Barbour, P. J.
Beaumont, J. F.
Becking, R. W.
Blake
Bowers, F. D.
Buck, W. R.
Burckhalter, R.
Burke, R. P.
Bush, B. F.
Carpenter, S.
Carver, G. W.
Chapman, C.
Cochrane, B. A.
Cochrane, T. S.
Cooper, T.
Curry, M. G.
Curtis, M. A.
Davidson, P.
Demaree, D.
Dey, J. P.
Diamond, A. R.
Earle, F. S.
Egan, R. S.
Embry, M. E. (Nance)
Evans, A. W.
Evers, A.
Eyde, R. H.
Folkerts, G. W.
Ginzbarg, S.
Goffinet, B.
Guccion, J. G.
Hale, M. E., Jr.
Hansen, C. J.
Harper, R. M.
Harris, R. C.
Hawley
Haynes, R. R.
Henssen, A.
Horne, K.
Hubricht, L.
Iltis, H. H.
Johnson, G. T.
Jones, S. C.
Lee (Mrs.)
Lesquereux
Lucas, L. W.
Lundbom, J.
Maxon, W. R.
McCullough, H. A.
McFarland, F. T.
McFay, J.
McLennan, L. R.
McVaugh, R.
Meigs, J.
Meyers, G. D.
Mohr, C. T.
Morgan-Jones, G.
Nash, T. H., III
Nee, M.
Nylander, W.
O'Bryan, D.
Payne, C.
Peck
Peters, T. M.
Piehl, M.
Pollard, C. L.
Pursell, R. A.
Ryan, B. D.
Sarnbarger
Scarborough, N.

Schallert, P. O.
Shushan, S.
Sierk, H. A.
Skorepa, A. C.
Stoneburner, A.
Svenson
Taylor, K.
Thomson, J. W.
Timme, S. L.
Tucker, S. C.
Underwood, L. M.
White
Wilson, L.
Wolf, W.
Word, D.
Worthley, E.
Wyatt, R.

## FORMAT OF THE CATALOG

Unless otherwise indicated, efforts have been made to include only those epithets specifically reported to occur in Alabama. Genera are listed alphabetically according to current, generally accepted nomenclature and followed by literature citation(s), synonym(s), or both. Synonyms are listed as they appeared in the original literature followed by the respective citations. Each citation, found in parentheses ( ), is preceded by double dashes and followed by the county of occurrence, if given. Additional county level distribution records discovered from herbarium searches at AUA, TROY, and UNA are also preceded by double dashes and the respective herbarium acronym. The sorting of nomenclature generally followed Esslinger (2002), and was supplemented by Fink (1935) and Lamb (1963). Accepted taxa reported for Alabama are listed in small capital letters while invalid taxa or reports are listed in italics. Entries within square brackets [ ] are designated as *nomina nuda*, misidentifications for North America or, if in conjunction with a question mark [?], indicate the epithet is most probably a dubious report for Alabama and has most likely either been misapplied or misidentified based on older European or more northern U.S. names (R. C. Harris, pers. comm.). Other general notes are contained in curved brackets { }.

## CATALOG OF ALABAMA LICHENS

**ACAROSPORA** A. Massal.
A. CONTIGUA H. Magn. {Reports of *Lecanora xanthoplana* Nyl. by (--Mohr 1901. Mobile) most likely belong here}

**AHTIANA** Goward
A. AURESCENS (Tuck.) Thell & Randlane (--Brodo et al. 2001. --R. C. Harris, pers. comm., Franklin) Syn: *Cetraria aurescens* Tuck. (--Mohr 1901. Lawrence)

**ALLOCETRARIA** Kurok. & Lai
A. OAKESIANA (Tuck.) Randlane & Thell. Syn: *Cetraria oakesiana* Tuck. (–Hale 1979)

**AMANDINEA** M. Choisy ex Scheid. & H. Mayrh.
A. POLYSPORA (Willey) E. Lay & P. May (--R. C. Harris, pers. comm. Baldwin)
A. PUNCTATA (Hoffm.) Coppins & Scheid. (--Brodo et al. 2001. --R. C. Harris, pers. comm. Baldwin, Cherokee, Lee) Syns: *Buellia myriocarpa* (DC.) De Not. (--Tuckerman 1888); *Buellia punctata* (Hoffm.) A. Massal. --UNA, Barbour); *Buellia punctata* (Hoffm.) A. Massal. var. *punctata* (--Imshaug 1951. Baldwin, Clay, Lee)

**ANAPTYCHIA** Körber

A. PALMULATA (Michx.) Vainio (--Kurokawa 1962. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Lee) Syns: *A. aquila* (Ach.) A. Massal. (--Fink 1935); *A. palmatula* (Michx.) Vainio (--Hale 1956. --McCullough 1962, 1964, 1967. Bibb, Calhoun, Cherokee, Clay, Coosa, Etowah, Jefferson, St. Clair, Shelby, Talladega. --R. C. Harris, pers. comm. Cleburne, Dekalb/Marshall. --UNA, Chambers); *Physcia aquila* (Ach.) Nyl. var. *dentosa* (E. Fries) Tuck. (--Tuckerman 1860, 1882)

**ANISOMERIDIUM** (Müll. Arg.) M. Choisy

A. BIFORME (Borrer) R. C. Harris (--UNA, Walker)

A. POLYPORI (Ellis & Everh.) M. E. Barr (--R. C. Harris, pers. comm. Cleburne)

**ANTHRACOTHECIUM** Hampe

A. NANUM (Zahlbr.) R. C. Harris (--Harris 1989. Lee)

**ANZIA** Stizenb.

A. COLPODES (Ach.) Stizenb. (--Hale 1955a. --McCullough 1964. Cleburne, Coosa, Randolph, Tallapoosa. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Lee. --TROY, Pike) Syn: *Parmelia colpodes* Ach.) Nyl. (--Mohr 1901. Lee)

A. ORNATA (Zahlbr.) Asah. (--McCullough 1963, 1964, 1967. Shelby, Tallapoosa, Winston. --Harris 1995)

**ARTHONIA** Ach.

A. CINNABARINA (DC.) Wallr. (--Tuckerman 1872. --Mohr 1901. Lawrence. --Brodo et al. 2001)

A. COMPLANATA Fée (--Tuckerman 1872. --Mohr 1901. Lawrence)

A. RUBELLA (Fée) Nyl. (--Tuckerman 1872. --Mohr 1901. Conecuh, Mobile. --Fink 1935. --R. C. Harris, pers. comm. Cherokee, Winston)

A. TAEDESCENS Nyl. (--Fink 1935. Alabama)

**ARTHOPYRENIA** A. Massal.

A. CINCHONAE (Ach.) Müll. Arg. (--Fink 1935. --Harris 1975. Baldwin, Cleburne, Lawrence) Syn: *Pyrenula cinchonae* (Ach.) Tuck. (--Mohr 1901. Mobile)

A. LYRATA R. C. Harris (--Harris 1975. Baldwin, Mobile. --Tucker & Harris 1980. --UNA, Coosa)

A. MALACCITULA (Nyl.) Zahlbr. Syn: *A. bifera* Zahlbr. (--Harris 1975. Baldwin)

**ARTHOTHELIUM** A. Massal.

A. SPECTABILE A. Massal. (--Fink 1935. --R. C. Harris, pers. comm. Dekalb/Marshall) Syn: *Arthonia spectabilis* Flot. (--Mohr 1901. Lawrence)

[? *A. taediosum* auct. Amer. (--R. C. Harris, pers. comm. Baldwin, Bibb) Syn: ?*Arthonia taediosa* auct. Amer. (--Mohr 1901. Conecuh, Mobile)] {Grube and Giralt (1996) published that American material is another species but declined to provide another name}

**ASPICILIA** A. Massal.

A. CINEREA (L.) Körber (--Brodo et al. 2001. --R. C. Harris, pers. comm. Clay, Dekalb) Syn: *Lecanora cinerea* (L.) Sommerf. (--Tuckerman 1882. --Mohr 1901. Lawrence)

A. CONTORTA (Hoffm.) Kremp. Syn: *Lecanora calcarea* (L.) Nyl. var. *contorta* Fr. (--Mohr 1901. Lawrence)

[? *A. gibbosa* (Ach.) Körber Syn: *Lecanora gibbosa* (Ach.) Nyl. (--Fink 1935. Alabama)]

**ASTROTHELIUM** Eschw.

A. VARIOLOSUM (Ach.) Müll. Arg. Syn: *Trypethelium catervarium* (Fée) Tuck. (--Tuckerman 1872, 1888. --Mohr 1901. Conecuh. --Fink 1935. Alabama)

**BACIDIA** De Not.

B. GRANOSA (Tuck.) Zahlbr. (--R. C. Harris, pers. comm. Colbert, Dekalb/Marshall) Syn: *Bilimbia granosa* (Tuck.) Fink (--Fink 1935)

B. HETEROCHROA (Müll. Arg.) Zahlbr. (--Ekman 1996. Baldwin)

[? *B. laurocerasi* (Delise ex Duby) Zahlbr. ssp. LAUROCERASI Syn: *B. atrogrisea* (Delise ex Hepp) Körber (--Tuckerman 1888)] {According to Ekman's (1996) revision, does not occur this far south. Reports from Alabama probably =B. HETEROCHROA, R. C. Harris]

B. POLYCHROA (Th. Fr.) Körber Syn: *Biatora fuscorubella* (Hoffm.) Tuck. (--Mohr 1901. Lawrence)

B. SCHWEINITZII (Fr. ex E. Michener) A. Schneider (--Tuckerman 1888. --Ekman 1996. Lee, Pike, Randolph, Talladega, Tuscaloosa. --Brodo et al. 2001. --R. C. Harris, pers. comm. Bibb, Calhoun, Cherokee, Cleburne, Dekalb/Marshall, Jackson, Lee, Lauderdale, Pike, Winston. --MIN, Covington. --UNA, Jefferson)

B. SUFFUSA (Fr.) A. Schneider (--R. C. Harris, pers. comm. Cherokee) Syn: *Biatora suffusa* Fr. (--Mohr 1901. Mobile)

**BACIDINA** Vezda

B. EGENULA (Nyl.) Vezda (--R. C. Harris, pers. comm. Blount)

**BATHELIUM** Ach.

B. CAROLINIANUM (Tuck.) R. C. Harris (--R. C. Harris, pers. comm. Cleburne, Dekalb/Marshall) {North American reports of *Trypethelium scoria* Fèe (--Tuckerman 1872. --Mohr 1901. Conecuh, Mobile,) belong here}

**BRIGANTIAEA** Trev.

B. LEUCOXANTHA (Spreng.) R. Sant. & Hafellner (--Hafellner 1997. --Brodo et al. 2001. --R. C. Harris, pers. comm. Bibb, Clay. --UNA, Randolph) Syns: *Heterothecium leucoxanthum* (Spreng.) Mass. (--Tuckerman 1872, 1888. --Mohr 1901. Lawrence, Mobile); *Lopadium leucoxanthum* (Spreng.) Zahlbr. (--Fink 1935)

**BUELLIA** De Not.

B. CURTISII (Tuck.) Imshaug (--Imshaug 1951. Baldwin, Mobile. --Harris 1988. --UNA, Coosa)

B. IMSHAUGIANA R. C. Harris Syn: *Baculifera imshaugiana* (R. C. Harris) Marbach (--Marbach 2000. Baldwin)

B. LAURICASSIAE (Fèe) Müll. Arg. (--Nordin 2000)

B. LEPIDASTRA (Tuck.) Tuck. (--Tuckerman 1888. --Fink 1935. Alabama. --Imshaug. 1951)

B. MAMILLANA (Tuck.) W. A. Weber (--R. C. Harris, pers. comm. Cherokee, Dekalb/Marshall) Syns: *B. thomae* (Tuck.) Imshaug (--Imshaug 1951. Baldwin); *Rinodina thomae* Tuck. (--Tuckerman 1882. --Mohr 1901. Lee, Winston)

B. SPURIA (Schaerer) Anzi (--Tuckerman 1888. --Mohr 1901. Mobile. --Imshaug 1951. Baldwin, Clay, Lee, Tuscaloosa. -Brodo et al. 2001. --R. C. Harris, pers. comm. Marion)

B. STELLULATA (Taylor) Mudd (--Fink 1935. Alabama)

B. STIGMAEA Tuck. (--Fink 1935. Alabama. --Imshaug 1951. Chilton, Etowah, Lee)

B. STILLINGIANA J. Steiner (--Imshaug 1951. Baldwin, Lee, Macon, Mobile, Talladega, Tallapoosa. --Brodo et al. 2001. --R. C. Harris, pers. comm. Bibb, Clay, Cleburne, Dekalb/Marshall, Lee, Marion)

**BULBOTHRIX** Hale

B. CONFOEDERATA (Culb.) Hale (--Hale 1976b. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Baldwin, Mobile) Syn: *Parmelia confoederata* Culb. (--Culberson 1961. Baldwin, Mobile. --Embry 1977. Macon)

B. GOEBELII (Zenker) Hale (--Hale 1976b. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Bibb) Syns: *Parmelia njalensis* C. W. Dodge (--McCullough 1964. Chambers, Tallapoosa); *Parmelia scortella* Nyl. (--McCullough 1967. Jefferson. --Embry 1977. Dallas, Lowndes, Marengo, Pickens, Sumter)

B. LAEVIGATULA (Nyl.) Hale (--Hale 1976b. --Hale 1979. --Brodo et al. 2001) Syn: *Parmelia laevigatula* Nyl. (--McCullough 1964. Randolph. --Embry 1977. Russell)

**BYSSOLOMA** Trev.

B. MEADII (Tuck.) S. S. Ekman (--Brodo et al. 2001)

**CALOPLACA** Th. Fr.

C. CAMPTIDIA (Tuck.) Zahlbr. (--Wetmore 1994. Baldwin, Mobile)

C. CERINA (Ehrh. ex Hedwig) Th. Fr. (--Brodo et al. 2001. --R. C. Harris, pers. comm. Lee) Syn: *Placodium cerinum* (Ehrh.) Naeg. (--Tuckerman 1882)

C. CINNABARINA (Ach.) Zahlbr. (--Wetmore & Kärnefelt 1999. Clay) Syn: *Placodium cinnabarinum* (Ach.) Anzi. (--Mohr 1901. Lawrence)

[? *C. ferruginea* (Hudson) Th. Fr. Syn: *Placodium ferrugineum* (Huds.) Hepp. (--Tuckerman 1882. --Mohr 1901. Lawrence, Mobile)]

C. FLAVORUBESCENS (Hudson) J. R. Laundon (--Brodo et al. 2001) Syns: *Placodium aurantiacum* (Lightf.) Naeg. & Hepp. (--Tuckerman 1882. --Mohr 1901. Lawrence)

C. FLAVOVIRESCENS (Wulfen) Dalla Torre & Sarnth. (--Brodo et al. 2001. --R. C. Harris, pers. comm. Dekalb/Marshall, Lee)

C. FLORIDANA (Tuck.) S. Tucker (--Wetmore 1994. Mobile) Syn: *Blastenia floridana* (Tuck.) Zahlbr. (--Fink 1935)

C. SCHAERERI (Flörke) Zahlbr. (--Fink 1935. Alabama)

C. SUBSOLUTA (Nyl.) Zahlbr. (--R. C. Harris, pers. comm. Colbert)

**CANDELARIA** A. Massal.

C. CONCOLOR (Dickson) Stein (--Embry 1977. Perry. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Baldwin. --AUA, Pike. --TROY, Coffee, Conecuh, Montgomery, Russell)

C. FIBROSA (Fr.) Müll. Arg. (--McCullough 1967. St. Clair, Talladega. --Embry 1977. Sumter. --Hale 1979. --Brodo et al. 2001) Syn: *Physcia candelaria* (Ach.) Nyl. var. *stellata* Nyl. (--Tuckerman 1860)

**CANDELARIELLA** Müll. Arg.

C. VITELLINA (Hoffm.) Müll. Arg. (--Fink 1935)

**CANOMACULINA** Elix & Hale

C. SUBTINCTORIA (Zahlbr.) Elix (--Brodo et al. 2001) Syns: *Parmelia subtinctoria* Zahlbr. (--Hale 1965. Coosa, St. Clair. --McCullough 1964, 1967. Calhoun, Cleburne, Coosa. --Embry 1977. Marengo, Perry, Pickens); *Parmotrema subtinctorium* (Zahlbr.) Hale (--Hale 1979)

**CANOPARMELIA** Elix & Hale

C. ALABAMENSIS (Hale & McCull.) Elix Syn: *Pseudoparmelia alabamensis* (Hale & McCull.) Hale (--Hale 1976a. St. Clair)

C. CAROLINIANA (Nyl.) Elix & Hale (--Brodo et al. 2001. --R. C. Harris, pers. comm. Baldwin, Bibb, Calhoun, Clay, Cleburne, Franklin, Lee, Marion, Winston) Syns: *Parmelia caroliniana* Nyl. (--Culberson 1957. --McCullough 1962, 1964, 1967. Bibb, Calhoun, Cherokee, Chilton, Clay, Cleburne, Coosa, Jefferson, Randolph, St. Clair, Shelby, Talladega, Tallapoosa. --Embry 1977. Dallas, Greene, Hale, Lowndes, Macon, Marengo, Montgomery, Perry, Pickens, Russell. --UNA, Escambia); *Pseudoparmelia caroliniana* (Nyl.) Hale (--Hale 1979)

C. CROZALSIANA (de Lesd. ex Harm.) Elix & Hale (--R. C. Harris, pers. comm. Morgan) Syns: *Parmelia crozalsiana* de Lesd. ex Harm. (--Embry 1977. Hale); *Pseudoparmelia crozalsiana* (de Lesd.) Hale (--Hale 1976a, 1979)

C. CRYPTOCHLOROPHAEA (Hale) Elix & Hale Syns: *Parmelia cryptochlorophaea* Hale (--Embry 1977. Russell); *Pseudoparmelia cryptochlorophaea* (Hale) Hale (--Hale 1976a, 1979)

C. SALACINIFERA (Hale) Elix & Hale Syn: *Pseudoparmelia salacinifera* (Hale) Hale (--Hale 1976a, 1979)

C. TEXANA (Tuck.) Elix & Hale (--Brodo et al. 2001. --R. C. Harris, pers. comm. Lee) Syns: *Parmelia texana* Tuck. (--McCullough 1967. Cherokee. --Embry 1977. Bullock); *Pseudoparmelia texana* (Tuck.) Hale (--Hale 1976a, 1979)

**CATILLARIA** A. Massal.

C. LENTICULARIS (Ach.) Th. Fr. (--R. C. Harris, pers. comm. Blount)

C. LEPTOCHEILA (Tuck.) Riddle (--Fink 1935. Alabama)

**CATINARIA** Vainio

C. ATROPURPUREA (Schaerer) Vezda & Poelt Syns: *Biatora atropurpurea* (Mass.) Hepp. (--Tuckerman 1872. --Mohr 1901. Conecuh); *Catillaria atropurpurea* (Schaerer) Th. Fr. (--Fink 1935. Alabama)

**CETRELIA** Culb. & C. Culb.

C. CHICITAE (Culb.) Culb. & C. Culb. (--Hale 1979)

C. OLIVETORUM (Nyl.) Culb. & C. Culb. (--Hale 1979)

**CHAENOTHECA** Th. Fr.

[? *C. ferruginea* (Turner ex Sm.) Mig. Syn: *Calicium melanophaeum* (Pers.) Ach. (--Mohr 1901. Lawrence)]

C. FURFURACEA (L.) Tibell (--R. C. Harris, pers. comm. Dekalb/Marshall)

**CHAENOTHECOPSIS** Vainio

C. NANA Tibell (--R. C. Harris, pers. comm. Dekalb, Marion) {saprophytic fungi related to lichens or lichenicolous fungi, Esslinger 2002}

**CHRYSOTHRIX** Mont.

C. CANDELARIS (L.) J. R. Laundon (--Brodo et al. 2001. --R. C. Harris, pers. comm. Bibb, Clay)

**CLADONIA** P. Browne

C. APODOCARPA Robbins (--McCullough 1962, 1964, 1967. Clay, Etowah, Jefferson, St. Clair, Talladega. --Thomson 1967a. --Brodo 1968. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Clay, Jackson. --UNA, Cherokee, Perry. --AUA, Clarke)

C. ARBUSCULA (Wallr.) Flotow (--R. C. Harris, pers. comm. Marion) Syns: *Cladina arbuscula* (Wallr.) Hale & Culb. (--Hale 1979); *C. rangiferina* (L.) Web. var. *sylvatica* L. (--Mohr 1901. Etowah)

C. BEAUMONTII (Tuck.) Vainio (--Fink 1935. Alabama. --Thomson 1967a. --Hale 1979. --Brodo et al. 2001) Syn: *C. santensis* Tuck. var. *beaumontii* Tuck. (--Mohr 1901. Conecuh)

C. BREVIS (Sandst.) Sandst. (--R. C. Harris, pers. comm. Marion)

C. CAESPITICIA (Pers.) Flörke (--Mohr 1901. Winston. --McCullough 1964, 1967. Etowah, Lee. --Thomson 1967a. --Hale 1979. --Brodo et al. 2001)

[? *C. cariosa* (Ach.) Spreng. (--McCullough 1967. Shelby)]

C. CAROLINIANA Tuck. (--Fink 1935. Alabama Evans 1947. Jackson, Randolph. --McCullough 1964. Randolph. --Thomson 1967a. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Franklin, Jackson, Marion. --UNA, Chambers. --AUA, Lee, Pike. --TROY, Conecuh)

C. CERVICORNIS (Ach.) Flotow ssp. VERTICILLATA (Hoffm.) Ahti Syns: *C. gracilis* (L.) Willd. ssp. *verticillata* Fr. (--Mohr 1901. Dekalb, Lawrence, Mobile); *C. verticillata* (Hoffm.) Schaerer (--Fink 1904. --McCullough 1967. Cherokee. --Thomson 1967a. --Hale 1979)

C. CHLOROPHAEA (Flörke ex Sommerf.) Spreng. (--McCullough 1962, 1964, 1967. Calhoun, Cherokee, Jefferson, Lee, Randolph, Shelby, Talladega, Tallapoosa --Thomson 1967a. --Brodo 1968. --Embry 1977. Bullock, Greene, Macon, Pickens, Russell. --Hale 1979. --Brodo et al. 2001. --UNA, Clay, Tuscaloosa, Winston. --AUA, Bibb, Covington. --TROY, Pike)

[? *C. coccifera* (L.) Willd. Syn: *C. cornucopioides* (L.) Fr. (--Mohr 1901. Cullman)]

C. CONIOCRAEA (Flörke) Spreng. (--McCullough 1964. Clay. --Brodo 1968. --Hale 1979. --Brodo et al. 2001) Syn: *C. fimbriata* (L.) Fr. var. *coniocraea* (Flörke) Vainio (--Fink 1935)

C. CRISPATA (Ach.) Flotow (--R. C. Harris, pers. comm. Marion)

C. CRISTATELLA Tuck. (--Tuckerman 1862, 1882. --Mohr 1901. Henry, Lawrence. --McCullough 1962, 1964, 1967. Bibb, Calhoun, Chambers, Cherokee, Chilton, Clay, Cleburne, Coosa, Jefferson, Lee, Randolph, Shelby, St. Clair, Talladega, Tallapoosa. --Embry 1977. Bullock, Dallas, Greene, Hale, Lowndes, Macon, Marengo, Montgomery, Perry, Pickens, Russell, Sumter. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Marion. --UNA, Tuscaloosa. --AUA, Crenshaw. --TROY, Dale, Geneva, Henry, Pike)

C. CYLINDRICA (A. Evans) A. Evans (--Thomson 1967a. --Embry 1977. Bullock, Macon. --Hale 1979. --UNA, Jefferson)

C. DIDYMA (Fée) Vainio (--Fink 1907, 1935. --Embry 1977. Sumter. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Clay, Cleburne, Franklin, Jackson, Winston) Syn: *C. pulchella* Schw. (--Tuckerman 1858, 1872, 1882. "Southern States" --Mohr 1901. Mobile)

C. DIDYMA (Fée) Vainio var. DIDYMA (--R. C. Harris, pers. comm. Macon)

C. DIDYMA (Fée) Vainio var. VULCANICA (Zoll. & Moritzi) Vainio Syn: *C. vulcanica* Zoll. & Moritzi (--Thomson 1967a. --Embry 1977. Pickens)

C. DIMORPHOCLADA Robbins (--Brodo et al. 2001. --R. C. Harris, pers. comm. Marion)

C. EVANSII Abb. (Evans 1947. Baldwin, Monroe. --Thomson 1967a) Syns: *Cladina evansii* (Abb.) Hale & Culb. (--Hale 1979. --Wyatt & Stoneburner 1982. Randolph. --Brodo et al. 2001. --AUA, Bullock, Coffee, Dale, Henry, Macon. --TROY, Covington, Pike)

C. FIMBRIATA (L.) Fr. (--Tuckerman 1882. "Southern States". --Brodo et al. 2001) Syn: *C. fimbriata* (L.) Fr. var. *tubaeformis* Fr. (--Mohr 1901)

C. FLOERKEANA (Fr.) Flörke (--Thomson 1967a. --Hale 1979. --Brodo et al. 2001)

C. FURCATA (Hudson) Schrader (--Tuckerman 1882. --McCullough 1964, 1967. Clay, Jefferson, Randolph. --Thomson 1967a. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Dekalb/Marshall, Franklin, Lawrence, Winston) Syns: *C. furcata* (Hudson) Schrader ssp. *pungens* Fr. (--Mohr 1901. Winston); *C. furcata* (Hudson) Schrader ssp. *racemosa* Flörke. (--Mohr 1901. Lawrence)

C. GRAYI G. Merr. ex Sandst. (--Thomson 1967a. --R. C. Harris, pers. comm. Clay, Cleburne, Franklin, Lee, Marion)

C. INCRASSATA Flörke (--McCullough 1962, 1964, 1967. Clay, Cleburne, Jefferson, Shelby. --Thomson 1967a. --Hale 1979)

C. LEPORINA Fr. (--Tuckerman 1858, 1872, 1888. "Southern States" --Mohr 1901. Mobile. --Evans 1947. Baldwin, Lee, Marion, Monroe, Randolph. --McCullough 1964, 1967. Randolph, Shelby. --Thomson 1967a. --Embry 1977. Macon, Russell. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Clay, Franklin, Marion. --UNA, Covington, Escambia, Tuscaloosa. --AUA, Coffee, Dale, Henry. --TROY, Bibb, Conecuh, Geneva, Pike)

C. MACILENTA Hoffm. (--Tuckerman 1882. --Thomson 1967a. --Hale 1979. --Brodo et al. 2001)

C. MACILENTA Hoffm. var. BACILLARIS (Genth) Schaerer (--Hale 1979. --AUA, Pike) Syn: *C. bacillaris* Nyl. (--Thomson 1967a. --R. C. Harris, pers. comm. Clay, Marion. --UNA, Pike. --TROY, Conecuh, Covington, Crenshaw, Pike, Tuscaloosa)

C. MATEOCYATHA Robbins (--Thomson 1967a. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Franklin)

C. PACHYCLADODES Vainio (--Thomson 1967a. --Hale 1979. --Brodo et al. 2001)

C. PARASITICA (Hoffm.) Hoffm. (--Thomson 1967a. --Hale 1979. --Brodo et al. 2001) Syn: *C. delicata* (Ehrh.) Flörke. (--Tuckerman 1882. --Mohr 1901. Lawrence)

C. PERFORATA A. Evans (--Brodo et al. 2001)

C. PETROPHILA R. C. Harris (--Harris 1992. Lee. --R. C. Harris, pers. comm. Clay, Dekalb/Marshall, Franklin, Jackson, Lee, Marion, Winston)

C. PEZIZIFORMIS (With.) J. R. Laundon (--Brodo et al. 2001. --R. C. Harris, pers. comm. Bibb, Clay, Cleburne) Syns: *C. capitata* (Michx.) Spreng. (--McCullough 1962, 1964, 1967. Bibb, Calhoun, Cherokee, Chilton, Clay, Cleburne, Coosa, Etowah, Jefferson, Lee, Randolph, St. Clair, Shelby, Talladega, Tallapoosa. --Thomson 1967a. --Embry 1977. Bullock, Dallas, Greene, Lowndes, Macon, Marengo, Perry, Pickens, Russell, Sumter. --Hale 1979. --UNA, Conecuh. --AUA, Covington, Crenshaw, Montgomery, Pike); *C. mitrula* Tuck. (--Tuckerman 1872. “Southern States” --Mohr 1901. Henry, Lawrence, Mobile)

C. PIEDMONTENSIS G. Merr. (--Fink 1935. Alabama. --McCullough 1964, 1967. Calhoun, Cherokee, Lee. --Thomson 1967a. --Brodo 1968. --Embry 1977. Bullock, Greene, Perry. --Hale 1979. --AUA, Bibb. --TROY, Pike)

C. PLEUROTA (Flörke) Schaerer (--Thomson 1967a. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Clay, Marion)

C. POLYCARPIA G. Merr. (--Evans 1944. Baldwin, Monroe. --McCullough 1967. Shelby, Talladega. --Culberson 1969. --Embry 1977. Bullock, Dallas, Greene, Macon, Marengo, Montgomery, Perry, Pickens, Russell. --R. C. Harris, pers. comm. Jackson, Marion. --TROY, Bibb) Syn: *C. subcariosa* Nyl. (--McCullough 1967. Calhoun, St. Clair, Shelby, Talladega. --Thomson 1967a. --Embry 1977. Bullock, Hale, Lowndes, Montgomery, Pickens) {Alabama reports of *C. symphycarpia* (Flörke) Fr. by (--Tuckerman 1882. --McCullough 1967. Bibb) and *C. symphycarpia* (Flörke) Fr. var. *epiphylla* Tuck. by (-- Mohr 1901. Winston), most probably belong here}

C. POLYCARPOIDES Nyl. (--Culberson 1969. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Clay. --UNA, Perry, Winston. --AUA, Bibb)

C. PROSTRATA A. Evans (--Thomson 1967a. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Baldwin)

C. PYXIDATA (L.) Hoffm. (--Mohr 1901. Mobile, Winston. --TROY, Covington, Pike)

C. RAMULOSA (With.) J. R. Laundon Syn: *C. pityrea* (Flörke) Fr. (--McCullough 1962, 1964, 1967. Bibb, Calhoun, Cherokee, Chilton, Clay, Etowah, Jefferson, Randolph, Shelby, St. Clair, Talladega, Tallapoosa. --Thomson 1967a. --Embry 1977. Greene, Macon. --Hale 1979)

C. RANGIFERINA (L.) F. H. Wigg. (--Tuckerman 1882. --Mohr 1901. Lawrence. --Fink 1935. Alabama. --McCullough 1964. Cleburne, Randolph. --Thomson 1967a. --Dey 1977. --Embry 1977. Bullock, Macon, Perry, Russell. --R. C. Harris, pers. comm. Clay, Franklin, Jackson, Marion) Syns: *Cladina rangiferina* (L.) Harm. (--Hale 1979. --Brodo et al. 2001. --AUA, Coffee, Conecuh, Covington, Henry, Lee, Pike. --TROY, Bibb, Butler, Crenshaw, Dale, Geneva, Macon)

C. RAPPII A. Evans (--Brodo et al. 2001) Syn: *C. calycantha* Delise ex Nyl. (--Thomson 1967a. --Hale 1979. --AUA, Pike)

C. RAVENELII Tuck. (--Fink 1935. Alabama. --McCullough 1962, 1967. Jefferson, Shelby. --Embry 1977. Macon. --R. C. Harris, pers. comm. Bibb, Marion)

C. ROBBINSII A. Evans (--Thomson 1967a. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Marion)

C. SANDSTEDEI Abb. (--UNA, Escambia)

C. SANTENSIS Tuck. (--Tuckerman 1882. --Mohr 1901. Lawrence. --Fink 1935. Alabama)

C. SOBOLESCENS Nyl. ex Vainio (--Brodo et al. 2001. --R. C. Harris, pers. comm. Clay. --UNA, Fayette) Syn: *C. clavulifera* Vainio (--McCullough 1967. Bibb. --Thomson 1967a. --Embry 1977. Bullock, Dallas, Greene, Macon, Montgomery, Perry. --Hale 1979. --TROY, Dale)

C. SQUAMOSA Hoffm. (--Tuckerman 1882. --Mohr 1901. Lawrence. --McCullough 1962, 1964, 1967. Bibb, Calhoun, Cherokee, Clay, Coosa, Jefferson, St. Clair, Shelby. --Thomson 1967a. --Brodo 1968. --Embry 1977. Greene, Perry, Sumter. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Clay, Cleburne, Franklin, Marion, Winston)

C. STREPSILIS (Ach.) Grognot (--Fink 1935. Alabama. --Thomson 1967a. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Clay, Franklin, Jackson, Marion. --UNA, Randolph)

C. SUBRADIATA (Vainio) Sandst. (--Brodo et al. 2001) Syn: *C. balfourii* Cromb. (--McCullough 1967. Shelby. --Hale 1979. --TROY, Bibb)

C. SUBSETACEA Robbins ex A. Evans (--Hale 1979)

C. SUBTENUIS (Abb.) Mattick (--McCullough 1964, 1967. Cherokee, Clay, Cleburne, Lee, Randolph, Shelby, Talladega, Tallapoosa. --Thomson 1967. --Embry 1977. Bullock, Greene, Hale, Lowndes, Macon, Russell. --R. C. Harris, pers. comm. Baldwin, Bibb, Clay, Franklin, Marion) Syn: *Cladina subtenuis* (Abb.) Hale & Culb. (--Hale 1979. --Brodo et al. 2001. --UNA, Fayette, Perry. --AUA, Coffee, Conecuh, Covington, Dale, Henry. --TROY, Barbour, Bibb, Crenshaw, Geneva, Pike, Tuscaloosa)

C. UNCIALIS (L.) F. H. Wigg. (--Mohr 1901. Winston. --Thomson 1967. --Brodo 1968. --Hale 1979. --Brodo et al. 2001. --TROY, Montgomery) Syn: *C. uncialis* (L.) F. H. Wigg. var. *caroliniana* Tuck. (--Mohr 1901. Lawrence. --R. C. Harris, pers. comm. Clay, Franklin, Jackson, Marion)

**CLAUZADEA** Hafellner & Bellem.

C. METZLERI (Koerb.) Clauzade & Cl. Roux ex D. Hawksw. (--R. C. Harris, pers. comm. Blount)

**COCCOCARPIA** Pers.

C. ERYTHROXYLI (Spreng.) Swinscow & Krog (--Hale 1979. --Brodo et al. 2001) Syns: *C. micheneri* Tuck. (--Tuckerman 1858); *C. parmelioides* (Hook.) Tuck. ex M.A. Curtis (--McCullough 1964. Coosa); *Pannaria molybdaea* (Pers.) Tuck. var. *cronia* Nyl. (--Tuckerman 1872. --Mohr 1901. Lawrence)

C. PALMICOLA (Spreng.) Arv. & D. J. Galloway (--Brodo et al. 2001. --R. C. Harris, pers. comm. Baldwin, Clay, Cleburne, Dekalb/Marshall, Jackson) {Alabama reports of *C. cronia* (Tuck.) Vainio (--McCullough 1962, 1964, 1967. Bibb, Calhoun, Chambers, Cherokee, Clay, Coosa, Etowah, Jefferson, Lee, Randolph, St. Clair, Shelby, Talladega, Tallapoosa. --Embry 1977. Bullock, Lowndes, Perry, Pickens. --Hale 1979) most probably belong here}

C. STELLATA Tuck. Syns: *Pannaria stellata* (Tuck.) Nyl. (--Tuckerman 1882. --Mohr 1901); *Parmeliella stellata* (Nyl.) Zahlbr. (--Fink 1935. Alabama)

**COENOGONIUM** Ehrenb.

C. DISJUNCTUM Nyl. (--Fink 1935. Alabama)

C. IMPLEXUM Nyl. (--Hale 1979. --Brodo et al. 2001)

C. INTERPOSITUM Nyl. (--Mohr 1901. Mobile)

**COLLEMA** F. H. Wigg.

C. CALLIBOTRYS Tuck. (--Tuckerman 1882. --Mohr 1901. Lee)

C. COCCOPHORUM Tuck. (--Brodo et al. 2001)

C. CONGLOMERATUM Hoffm. (--Hale 1979)

C. CONGLOMERATUM Hoffm. var. CRASSIUSCULUM (Malme) Degel. Syns: *C. cyrtaspis* Tuck. (--Tuckerman 1862, 1882. --Mohr 1901. Lee, Winston); *C. pycnocarpum* Nyl. (--Tuckerman 1872, 1882. --Mohr 1901. Lawrence); *Synechoblastus cyrtaspis* (Tuck.) Fink (Fink 1935)

C. CRISPUM (Hudson) F. H. Wigg. (--McCullough 1967. Calhoun. --Embry 1977. Sumter)

C. FASCICULARE (L.) F. H. Wigg. Syns: *C. aggregatum* Nyl. (--Mohr 1901. "Abbeville" {Henry}); *Synechoblastus aggregatus* (Ach.) T. Fr. (Fink 1935)

C. FLACCIDUM (Ach.) Ach. (--McCullough 1967. Shelby. --Hale 1979. --R. C. Harris, pers. comm. Dekalb/Marshall)

C. FURFURACEUM (Arnold) Du Rietz (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Dekalb/Marshall, Winston)

C. LEPTALEUM Tuck. (--Tuckerman 1864, 1872, 1882. --Mohr 1901. Lawrence, Lee)

C. LEPTALEUM Tuck. var. BILIOSUM (Mont.) Degel. (--Degelius 1974. Lee)

C. NIGRESCENS (Hudson) DC. (--Tuckerman 1882. --Mohr 1901. Mobile. --McCullough 1964, 1967. Calhoun, Cleburne, Jefferson, St. Clair, Tallapoosa. --Hale 1979. --Brodo et al. 2001) Syns: *C. nigrescens* (Hudson) DC. var. *leioplaca* Tuck. (--Mohr 1901. Mobile)

C. OCCULTATUM Bagl. (--Degelius 1974. Lee)

C. POLYCARPON Hoffm. (--Hale 1979)

C. PULCELLUM Ach. (--Brodo et al. 2001) Syn: *Leptogium pulchellum* (Ach.) Nyl. (--Tuckerman 1872, 1882. --Mohr 1901. Lee, Winston)

C. PULCELLUM Ach. var. SUBNIGRESCENS (Müll. Arg.) Degel. (--Degelius 1974)

C. PUSTULATUM Ach. (--Tuckerman 1882. --Mohr 1901. Lawrence. --Fink 1935. Alabama. --Degelius 1974)

C. RYSSOLEUM (Tuck.) A. Schneider (--Hale 1979)

C. SUBFLACCIDUM Degel. (--Degelius 1974. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Winston. --UNA, Coosa) Syn: *C. subfurvum* (Müll. Arg.) Degel. (--McCullough 1964, 1967. Chilton, St. Clair. --Embry 1977. Dallas, Sumter. {Records of *C. subfurvum* sensu Degelius (1954) = C. SUBFLACCIDUM, Degelius corrected himself in 1974 (R. C. Harris, pers. comm.)}

C. TENAX (Sw.) Ach. (--Mohr 1901. Lawrence. --Hale 1979) Syn: *C. pulposum* (Bernh.) Ach. (--Fink 1935)

C. TEXANUM Tuck. (--Tuckerman 1872, 1882. --Mohr 1901. Lawrence) Syns: *C. laciniatum* Nyl. (--Tuckerman 1872, 1882. --Mohr 1901. Lawrence); *Synechoblastus laciniatus* (Nyl.) Fink (Fink 1935. Alabama); *Synechoblastus texanus* (Tuck.) Müll. Arg. (Fink 1935. Alabama)

C. TEXANUM Tuck. var. STELLATUM (Tuck.) Degel. (--Degelius 1974. Lawrence)

**CRESPONEA** Egea & Torrente

C. PREMNEA (Ach.) Egea & Torrente var. SAXICOLA (Leighton) Egea & Torrente Syn: *Lecanactis premnea* (Ach.) Arnold (--Tuckerman 1888)

**CROCYNIA** (Ach.) A. Massal.

C. PYXINOIDES Nyl. (--Brodo et al. 2001)

**CRYPTOTHECIA** Stirton

C. RUBROCINCTA (Ehrenb. : Fr.) Thor (--Brodo et al. 2001. --UNA, Baldwin) Syns: *Chiodecton rubrocinctum* (Ehrenb.) Nyl. (--Mohr 1901. Mobile); *Chiodecton sanguineum* (Sw.) Vainio (--Fink 1935. Alabama. --UNA, Conecuh); *Herpothallon sanguineum* (Sw.) Tobler (--Culberson 1964. Mobile)

C. STRIATA Thor (--Brodo et al. 2001) Syns: *Chiodecton montagnaei* Tuck. (--Mohr 1901. Mobile. --UNA, Conecuh); *Enterostigma montagnaei* (Tuck.) Fink (--Fink 1935. Alabama)

**CYSTOCOLEUS** Thwaites

C. EBENEUS (Dillwyn) Thwaites (--R. C. Harris, pers. comm. Franklin, Jackson, Winston)

**DERMATOCARPON** Eschw.

D. LURIDUM (With.) J. R. Laundon (--Brodo et al. 2001) Syns: *D. fluviatile* (Weber) Th. Fr. (--McCullough 1964, 1967. Randolph, Shelby. --Hale 1979); *Endocarpon miniatum* (L.) Schaer. var. *aquaticum* Schaer. (--Mohr 1901. Lawrence)

D. MINIATUM (L.) W. Mann (--McCullough 1964. Cleburne. --Brodo 1968. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Clay, Cherokee, Dekalb/Marshall. --UNA, Randolph) Syns: *Endocarpon miniatum* (L.) Schaer. (--Mohr 1901. Lawrence); *Endocarpon miniatum* (L.) Schaer. var. *muhlenbergii* Ach. (--Mohr 1901. Winston)

**DIBAEIS** Clem.

D. ABSOLUTA (Tuck.) Kalb & Gierl (--R. C. Harris, pers. comm. Winston) Syn: *Baeomyces absolutus* Tuck. (--Tuckerman 1859, 1872, 1888. --Mohr 1901. On bare sandy ground. Lawrence. --Fink 1935. Alabama. --McCullough 1967. Shelby. --Thomson 1967b. Baldwin. --Hale 1979)

D. BAEOMYCES (L. f.) Rambold & Hertel (--Brodo et al. 2001) Syns: *Baeomyces fungoides* (Sw.) Ach. (--Hale 1979. --UNA, Coosa); *Baeomyces roseus* Pers. (--Tuckerman 1888. --Mohr 1901. --Thomson 1967b. Dale, Lee)

**DICTYONEMA** C. Agardh

D. SERICEUM (Sw.) Berk. (--R. C. Harris, pers. comm. Shelby) Syn: *D. guadalupense* (Rabenh.) Zahlbr. (--McCullough 1967. Shelby)

**DIMELAENA** Norman

D. OREINA (Ach.) Norman (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Clay)

**DIMERELLA** Trev.

D. LUTEA (Dicks.) Trev. (--Brodo et al. 2001) Syn: *Gyalecta lutea* (Dicks.) Tuck. (--Tuckerman 1872, 1882. --Mohr 1901. Conecuh, Mobile)

D. PINETI (Ach.) Vezda (--R. C. Harris, pers. comm. Cherokee, Jackson)

**DIPLOSCHISTES** Norman

D. MUSCORUM (Scop.) R. Sant. (--Brodo et al. 2001. --R. C. Harris, Marion)

D. SCRUPOSUS (Schreber) Norman (--McCullough 1967. Shelby. --Lumbsch 1989. --Brodo et al. 2001. --R. C. Harris, pers. comm. Jackson, Marion) Syn: *Urceolaria scruposa* (Schreber) Ach. (--Fink 1935)

**DIPLOTOMMA** Flotow

D. ALBOATRUM (Hoffm.) Flotow Syn: *Rhizocarpon alboatrum* (Hoffm.) Anzi (--Fink 1935)

**DIRINARIA** (Tuck.) Clem.

D. AEGIALITA (Afz.) B. Moore (--Brodo et al. 2001) Syns: *D. aspera* (H. Magn.) D. D. Awasthi (--Hale 1979); *Physcia aegialita* (Ach.) Nyl. (--Thomson 1963. Baldwin, Mobile. --McCullough 1967. St. Clair, Shelby); *Physcia aspera* H. Magn. (--Thomson 1963. Baldwin)

D. APPLANATA (Fée) D. D. Awasthi Syn: *Physcia applanata* (Fèe) Nyl. (--Tuckerman 1860)

D. CONFUSA D. D. Awasthi (--Hale 1979. --Brodo et al. 2001)

D. FROSTII (Tuck.) Hale & Culb. (--Hale 1979) Syn: *Physcia frostii* (Tuck.) Zahlbr. (--Thomson 1963. Shelby. --McCullough 1964, 1967. Cleburne, St. Clair)

D. PICTA (Sw.) Clem. & Shear (--Brodo et al. 2001) Syns: *Physcia picta* (Sw.) Nyl. (--Thomson 1963. Baldwin, Cleburne, Mobile); *Pyxine picta* (Sw.) Tuck. (--Tuckerman 1882. --Mohr 1901. Mobile. --Hale 1979)

D. PURPURASCENS (Vainio) B. Moore (--Brodo et al. 2001)

**ENDOCARPON** Hedwig

E. PUSILLUM Hedwig (--Brodo et al. 2001. --R. C. Harris, pers. comm. Blount, Lawrence)

**ENDOCOCCUS** Nyl.

E. PROPINQUUS (Körber) D. Hawksw. (--R. C. Harris, pers. comm. Dekalb/Marshall) {lichenicolous fungi}

**ENDOHYALINA** Marbach

E. CIRCUMPALLIDA (Magnusson) Marbach Syn: *Buellia amphidexia* Imshaug ex R. C. Harris (--Imshaug 1951. Baldwin. --Harris 1988)

E. RAPPII (Imshaug ex R.C. Harris) Marbach Syn: *Buellia rappii* Imshaug ex R.C. Harris (--Imshaug 1951. Baldwin)

**EPHEBE** Fr.

E. LANATA (L.) Vainio (--Fink 1935. Alabama. --McCullough 1967. St. Clair. --Hale 1979. --Brodo et al. 2001) Syn: *E. pubescens* Fr. (--Tuckerman 1882. --Mohr 1901. Cullman, Winston. --UNA, Dekalb)

E. SOLIDA Bornet (--Mohr 1901. Marshall. --Fink 1935. Alabama. --Henssen 1963b. --McCullough 1967. Shelby)

**EVERNIASTRUM** Hale ex Sipman

E. CATAWBIENSE (Degel.) Hale ex Sipman (--Brodo et al. 2001)

**FLAKEA** O. Eriksson

F. PAPILLATA O. E. Eriksson (--P. Davidson, pers. comm. Jackson. --R. C. Harris, pers. comm. Clay, Dekalb/Marshall, Jackson, Winston) {unknown lichen family}

**FLAVOPARMELIA** Hale
F. BALTIMORENSIS (Gyel. & Fóriss) Hale (--Brodo et al. 2001. --R. C. Harris, pers. comm. Clay, Dekalb/Marshall, Jackson, Lee) Syn: *Pseudoparmelia baltimorensis* (Gyel. & Fóriss) Hale (--Hale 1976a, 1979)
F. CAPERATA (L.) Hale (--Brodo et al. 2001. --R. C. Harris, pers. comm. Bibb, Calhoun, Cleburne, Marion, Morgan) Syn: *Parmelia caperata* (L.) Ach. (--Tuckerman 1882. "Southern States" --McCullough 1962, 1964, 1967. Bibb, Calhoun, Chambers, Cherokee, Clay, Cleburne, Coosa, Etowah, Jefferson, Randolph, St. Clair, Shelby, Talladega, Tallapoosa. --Brodo 1968. --Embry 1977. Greene, Hale, Perry, Russell); *Pseudoparmelia caperata* (L.) Hale (--Hale 1976a, 1979. --TROY, Macon, Pike)
F. RUTIDOTA (Hook. f. & Taylor) Hale Syn: *Pseudoparmelia rutidota* (Hook. f. & Taylor) Hale (--Hale 1976a. "Southern States")

**FUSCOPANNARIA** P. M. Jørg.
F. LEUCOPHAEA (Vahl) P. M. Jørg. (--Brodo et al. 2001. --R. C. Harris, pers. comm. Cherokee, Winston) Syn: *Parmeliella microphylla* (Sw.) Müll. Arg. (--McCullough 1962, 1967. Jefferson)
F. LEUCOSTICTA (Tuck.) P. M. Jørg. (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Cleburne) Syn: *Pannaria leucosticta* Tuck. (--Tuckerman 1860, 1872, 1882. --Mohr 1901. Lawrence, Mobile. --McCullough 1962, 1964, 1967. Clay, Coosa, Jefferson, St. Clair, Shelby, Tallapoosa. --Hale 1979. --R. C. Harris, pers. comm. Cleburne, Lee)

**GASSICURTIA** Fée
G. CATASEMA (Tuck.) Marbach Syn: *Buellia caloosensis* Tuck. (--Tuckerman 1888)
G. ELIZAE (Tuck.) Marbach Syn: *Buellia elizae* (Tuck.) Tuck. (--Imshaug 1951)
G. VERNICOMA (Tuck.) Marbach Syn: *Buellia vernicoma* (Tuck.) Tuck. (--Tuckerman 1888. --Imshaug 1951. Lawrence. --R. C. Harris, pers. comm. Marion)

**GLYPHIS** Ach.
G. CICATRICOSA Ach. (--Brodo et al. 2001. --R. C. Harris, pers. comm. Cleburne, Dekalb/Marshall) Syn: *G. achariana* Tuck. (--Tuckerman 1858, 1872, 1888. --Mohr 1901. Lawrence, Mobile)

**GOMPHILLUS** Nyl.
G. AMERICANUS Essl. (--Buck 1998. --Brodo et al. 2001)

**GRAPHINA** Müll. Arg.
G. ANTILLARUM (Vainio) Zahlbr. (--Harris 1990)
G. COLUMBINA (Tuck.) M. Wirth & Hale Syn: *Graphis columbina* Tuck. (--Tuckerman 1888)
G. INCRUSTANS (Fée) Müll. Arg. Syn: *G. glaucoderma* (Nyl.) Müll. Arg. (--Fink 1935. Alabama)
G. SCOLECITIS (Tuck.) Fink (--Fink 1935) Syn: *Graphis scolecites* Tuck. (--Tuckerman 1872, 1888. --Mohr 1901. Conecuh, {misspelled as *G. solecites*})

**GRAPHIS** Adans.
G. AFZELII Ach. (--Tuckerman 1872. --Mohr 1901. Mobile. --Brodo et al. 2001)
G. ELEGANS (Borrer ex Sm.) Ach. (--Tuckerman 1872. --Mohr 1901. Conecuh)
G. INSIDIOSA (C. Knight & Mitten) Hook. f. (--R. C. Harris, pers. comm. Dekalb/Marshall) Syns: *G. babingtonii* Tuck. (--Tuckerman 1872); *G. beaumontii* Tuck. (--Tuckerman 1888. --Mohr 1901. Conecuh)
G. INTRICATA Fée (--Fink 1935. Alabama)
G. LUCIFICA R. C. Harris (--R. C. Harris, pers. comm. Bibb)
G. SCRIPTA Ach. (--Mohr 1901. --Brodo et al. 2001. --R. C. Harris, pers. comm. Dekalb/Marshall. --UNA, Covington)
G. STRIATULA (Ach.) Spreng. (--Mohr 1901. Mobile)
G. SUBELEGANS Nyl. (--R. C. Harris, pers. comm. Dekalb/Marshall)
G. TENELLA Ach. (--Fink 1935. Alabama. --UNA, Barbour)

**GYALECTA** Ach.

G. FARLOWII Tuck. ex Nyl. Syn: *Petractis farlowii* (Tuck. ex Nyl.) Vezda (--R. C. Harris, pers. comm. Dekalb/Marshall)

G. JENENSIS (Batsch) Zahlbr. (--Fink 1935. Alabama) Syn: *G. cupularis* (Hedw.) Tuck. (--Tuckerman 1882. --Mohr 1901. Lawrence)

**GYROSTOMUM** Fr.

G. SCYPHULIFERUM (Ach.) Nyl. (--Mohr 1901. Mobile. --Fink 1935. Alabama)

**HAEMATOMMA** A. Massal.

H. ACCOLENS (Stirton) Hillm. (--Brodo et al. 2001)

H. FLEXUOSUM Hillm. (--C. M. Wetmore, pers. comm. Covington) {See note under *H. puniceum*}

H. PERSOONII (Fée) A. Massal. (--Brodo et al. 2001) *Lecanora punicea* Ach.

[*H. puniceum* (Ach.) Mass. is recognized restricted to its type collection from Peru. Alabama reports of *H. puniceum* (--UNA, Conecuh, Covington, Dale, Geneva) and of *Lecanora punicea* Ach. (--Tuckerman 1882. --Mohr 1901. Mobile, North Alabama) most probably =H. FLEXUOSUM and H. PERSOONII, the two most common taxa in the Southeast encompassed by older concept of *H. puniceum*, R. C. Harris, pers. comm.]

**HAFELLIA** Kalb, H. Mayrh. & Scheid.

H. BAHIANA (Malme) Sheard (--Sheard 1992. Baldwin)

H. CALLISPORA (C. Knight) H. Mayrh. & Sheard (--Sheard 1992)

H. CURATELLAE (Malme) Marbach Syn: *Buellia conspirans* (Nyl.) Vainio (--Imshaug 1951. Baldwin)

[? *H. disciformis* (Fr.) Marbach & H. Mayrhofer Syns: *Buellia disciformis* (Fr.) Mudd (--Mohr 1901. Mobile); *Buellia parasema* (Ach.) De Not. (--Mohr 1901. Mobile); *Buellia subdisciformis* Lightf. (--Mohr 1901. Mobile)]

H. PARASTATA (Nyl.) Kalb Syn: *Buellia rinodinospora* Riddle (--Imshaug 1951)

**HEPPIA** Nägeli

H. LUTOSA (Ach.) Nyl. (--Wetmore 1970. --Hale 1979) Syns: *H. despreauxii* (Mont.) Tuck. (--Tuckerman 1882. --Mohr 1901. Lawrence)

**HETERODERMIA** Trev.

H. ALBICANS (Pers.) Swinscow & Krog (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Baldwin, Clay, Dekalb/Marshall. --UNA, Conecuh, Pickens) Syns: *Anaptychia domingensis* (Ach.) A. Massal. (--McCullough 1962, 1964, 1967. Chambers, Cherokee, Coosa, Jefferson, Shelby, Talladega, Tallapoosa); *Anaptychia ravenelii* (Tuck.) Zahlbr. (--Embry 1977. Bullock, Dallas, Greene, Hale, Lowndes, Macon, Marengo, Montgomery, Perry, Pickens, Russell, Sumter)

H. CASARETTIANA (A. Massal.) Trev. (--Hale 1979. --TROY, Crenshaw) Syn: *Anaptychia casarettiana* A. Massal. (--McCullough 1962, 1964, 1967. Bibb, Calhoun, Cherokee, Clay, Cleburne, Coosa, Etowah, Jefferson, Randolph, St. Clair, Shelby, Talladega. --Embry 1977. Bullock, Dallas, Greene, Russell, Sumter)

H. ECHINATA (Taylor) Culb. (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Lee. --UNA, Chilton, Conecuh. --AUA, Crenshaw, Pike. --TROY, Covington, Pike, Russell)

H. GALACTOPHYLLA (Tuck.) Culb. Syns: *Physcia comosa* (Eschw.) Nyl. (--Mohr 1901. Mobile); *Physcia speciosa* Fr. var. *galactophylla* Tuck. (--Tuckerman 1860)

H. GRANULIFERA (Ach.) Culb. (--Hale 1979. --TROY, Crenshaw) Syn: *Anaptychia granulifera* (Ach.) A. Massal. (--Kurokawa 1962. --McCullough 1964, 1967. Coosa, Jefferson, Talladega)

H. HYPOLEUCA (Ach.) Trev. (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Clay) Syns: *Anaptychia hypoleuca* (Muhl.) A. Massal. (--Hale 1956. --McCullough 1964, 1967. Cherokee, Coosa, St. Clair, Talladega); *Physcia hypoleuca* (Muhl.) Tuck. (--Mohr 1901. Mobile)

H. LEUCOMELA (L.) Poelt (--Brodo et al. 2001) Syns: *Anaptychia leucomela* (L.) Mass. (--McCullough 1964. Clay, Tallapoosa {as "*A. leucomelaena*"}); *H. leucomelaena* (L.) Poelt (--Hale 1979)

H. OBSCURATA (Nyl.) Trev. (--Hale 1979. --Brodo et al. 2001. --UNA, Geneva) Syn: *Anaptychia obscurata* (Nyl.) Vainio (--McCullough 1962, 1964, 1967. Bibb, Calhoun, Chambers, Cherokee, Chilton, Clay, Cleburne, Coosa, Etowah, Jefferson, Lee, Randolph, St. Clair, Shelby, Talladega. --Embry 1977. Bullock, Dallas, Greene, Hale, Lowndes, Macon, Marengo, Perry, Pickens, Russell)

H. PROPAGULIFERA (Vainio) J. P. Dey Syn: *Anaptychia dendritica* (Pers.) Vainio var. *propagulifera* (Pers.) Vainio (McCullough 1962, 1967. Jefferson, Shelby)

H. SPECIOSA (Wulfen) Trev. (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Calhoun, Cleburne, Dekalb/Marshall, Jackson, Winston) Syns: *Anaptychia pseudospeciosa* Kurok. var. *tremulans* (Müll. Arg.) Kurok. (--McCullough 1967. Bibb, Calhoun, Cherokee, Jefferson, St. Clair, Shelby, Talladega); *Anaptychia speciosa* (Wulfen) A. Massal. (--McCullough 1962, 1964. Chilton, Clay, Cleburne, Jefferson, Randolph, Tallapoosa. --Embry 1977. Lowndes, Perry, Russell, Sumter) ; *Physcia speciosa* Fr. (--Tuckerman 1882. --Mohr 1901. Conecuh, Mobile); *Physcia speciosa* Fr. var. *stellata* Tuck. (--Tuckerman 1860)

H. SQUAMULOSA (Degel.) Culb. (--Hale 1979)

**HYPERPHYSCIA** Müll. Arg.

H. ADGLUTINATA (Flörke) H. Mayrh. & Poelt (--Brodo et al. 2001) Syns: *Physcia adglutinata* (Flörke) Nyl. (--Tuckerman 1882. --Mohr 1901. Lawrence); *Physcia elaeina* (Sm.) A. L. Sm. (--Thomson 1963. Baldwin)

H. SYNCOLLA (Tuck. ex Nyl.) Kalb (--Brodo et al. 2001) Syns: *Physcia syncolla* Tuck. ex Nyl. (--Thomson 1963. St. Clair); *Physciopsis syncolla* (Tuck. ex Nyl.) Poelt (--Hale 1979)

**HYPOGYMNIA** (Nyl.) Nyl.

H. KROGIAE Ohlsson (--Hale 1979)

H. PHYSODES (L.) Nyl. (--Hale 1979)

**HYPOTRACHYNA** (Vainio) Hale

H. COSTARICENSIS (Nyl.) Hale (--Harris 1993. Bibb) {only N. American record, R. C. Harris, pers. comm.}

H. DENTELLA (Hale & Kurok.) Hale (--Hale 1975. "Southeastern US") Syn: *Parmelia dentella* Hale & Kurok. (--Hale & Kurokawa 1964. Clay)

H. IMBRICATULA (Zahlbr.) Hale (--Hale 1979)

H. LAEVIGATA (Sm.) Hale Syn: *Parmelia laevigata* (Sm.) Ach. (--Mohr 1901. Mobile. --Fink 1935)

H. LIVIDA (Taylor) Hale (--Hale 1975. "Southeastern US" --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Baldwin, Bibb, Clay, Franklin, Macon, Marion, Winston. --UNA, Fayette) Syn: *Parmelia livida* Taylor (--Culberson 1961. --McCullough 1962, 1964, 1967. Bibb, Calhoun, Cherokee, Chilton, Clay, Cleburne, Coosa, Jefferson, Lee, Randolph, St. Clair, Shelby, Talladega, Tallapoosa. --Embry 1977. Bullock, Dallas, Greene, Hale, Lowndes, Macon, Marengo, Montgomery, Perry, Pickens, Russell, Sumter. --UNA, Covington, Geneva, Henry, Pike)

H. OSSEOALBA (Vainio) Park & Hale (--Brodo et al. 2001. --R. C. Harris, pers. comm. Clay, Marion) Syns: *H. formosana* (Zahlbr.) Hale (--Hale 1979); *Parmelia formosana* Zahlbr. (--McCullough 1962, 1964, 1967. Calhoun, Cherokee, Coosa, Jefferson, Lee. --Hale 1958, 1972. Cleburne, Dallas, Dekalb, Shelby)

H. PUSTULIFERA (Hale) Skorepa (--R. C. Harris, pers. comm. Clay) Syn: *Parmelia pustulifera* Hale (--Hale 1972. Shelby)

H. ROCKII (Zahlbr.) Hale (--Hale 1975. "Southeastern US" --R. C. Harris, pers. comm. Clay)

**IMSHAUGIA** S. F. Meyer

I. ALEURITES (Ach.) S. F. Meyer (--Brodo et al. 2001. --R. C. Harris, pers. comm. Dekalb) Syn: *Parmeliopsis aleurites* (Ach.) Nyl. (--McCullough 1964, 1967. Calhoun, Cleburne. --Brodo 1968. --Hale 1979)

**IONASPIS** Th. Fr.

I. LACUSTRIS (With.) Lutzoni (--R. C. Harris, pers. comm. Clay, Marion) Syn: *Lecanora lacustris* (With.) Nyl. (--Mohr 1901. Lawrence)

**JULELLA** Fabre

J. FALLACIOSA (Arnold) R. C. Harris (--R. C. Harris, pers. comm. Cleburne, non-lichenized)

**LASALLIA** Mérat

L. PAPULOSA (Ach.) Llano (--Llano 1950. Clay, Etowah. --McCullough 1964, 1967. Cleburne, Shelby. --Dey 1977. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Clay, Dekalb. --AUA, Dekalb) Syns: *Umbilicaria papulosa* (Ach.) Nyl. (--UNA, Dekalb); *Umbilicaria pustulata* (L.) Hoffm. var. *papulosa* Tuck. (--Mohr 1901. Dekalb, Talladega, "summit of Chehawhaw [sic] Mountain" {Cleburne})
L. PENSYLVANICA (Hoffm.) Llano (--Brodo et al. 2001. --R. C. Harris, pers. comm. Clay)

LECANIA A. Massal.

[? *L. cyrtella* (Ach.) Th. Fr. Syn: *Biatora cyrtella* (Ach.) Tuck. (--Mohr 1901. Mobile)]

**LECANORA** Ach.

[? *L. albella* (Pers.) Ach. Syn: *L. pallida* (Schreber) Rabenh. (--Tuckerman 1882. --Mohr 1901. Mobile)]
L. ALLOPHANA Nyl. Syn: *L. subfusca* (L.) Ach. var. *coilocarpa* Ach. (--Mohr 1901. Mobile)
L. ARGENTATA (Ach.) Malme (--R. C. Harris, pers. comm. Dekalb/Marshall)
L. CAESIORUBELLA Ach. (--Brodo et al. 2001. --R. C. Harris, pers. comm. Dekalb/Marshall, Winston. --UNA, Covington)
L. CAESIORUBELLA Ach. ssp. GLAUCOMODES (Nyl.) Imshaug & Brodo (--Imshaug & Brodo 1966. Baldwin)
L. CAESIORUBELLA Ach. ssp. PROLIFERA (Fink) R. C. Harris (--R. C. Harris, pers. comm. Cleburne, Lee, Macon, Marion) Syn: *L. caesiorubella* Ach. ssp. *lathamii* Imshaug & Brodo (Imshaug & Brodo 1966. Clay, Lee, Tuscaloosa)
L. CENISIA Ach. (--Brodo et al. 2001)
L. CHLAROTERA Nyl. (--UNA, Chilton, Pike, Walker)
L. CINEREOFUSCA H. Magn. (--Brodo et al. 2001)
L. CINEREOFUSCA H. Magn. var. APPALACHENSIS Brodo (--R. C. Harris, pers. comm. Clay)
L. CUPRESSI Tuck. (--Brodo et al. 2001)
L. HAGENII (Ach.) Ach. (--Tuckerman 1882. --Mohr 1901. Lawrence, Mobile)
L. HYBOCARPA (Tuck.) Brodo (--Brodo 1984. --Brodo et al. 2001. --R. C. Harris, pers. comm. Baldwin, Bibb, Lee, Mobile, Winston)
L. IMSHAUGII Brodo (--Brodo 1984. --R. C. Harris, pers. comm. Lee)
L. LEPROSA Fée (--Brodo 1984)
L. LOUISIANAE de Lesd. (--Brodo 1984. --R. C. Harris, pers. comm. Baldwin)
L. MURALIS (Schreber) Rabenh. (--Mohr 1901. Winston. --Hale 1979)
L. OREINOIDES (Körber) Hertel & Rambold (--Brodo et al. 2001. --R. C. Harris, pers. comm. Jackson, Lee) Syn: *Lecidea tesselina* Tuck. (--Tuckerman 1888. --Mohr 1901. Winston {spelled *L. tessellina*} --Magnusson 1935)
L. STROBILINA (Spreng.) Kieffer (--Brodo et al. 2001. --R. C. Harris, pers. comm. Baldwin, Jackson, Lee)
L. SUBIMMERGENS Vainio (--Brodo 1984. --R. C. Harris, pers. comm. Lee)
L. THYSANOPHORA Harris (--Brodo et al. 2001)

L. VARIA (Hoffm.) Ach. (--Mohr 1901. Lawrence, Mobile)

**LECIDEA** Ach.

L. HYPOMELA Nyl. Syn: *Biatora hypomela* Nyl. (--Tuckerman 1888. --Mohr 1901. Mobile)

L. LURIDA (Ach.) DC. Syns: *Biatora petri* Tuck. (--Tuckerman 1877, 1888. --Mohr 1901. Lawrence); *Psora petri* (Tuck.) Fink (--Fink 1935. Alabama. --Schneider 1979)

L. MAMILLANA Tuck. (--Tuckerman 1877. --Mohr 1901. Winston. --Fink 1935. Alabama)

**LECIDELLA** Körb.

L. EUPHOREA (Flörke) Hertel (--R. C. Harris, pers. comm. Calhoun)

**LEMPHOLEMMA** Körber

L. POLYANTHES (Bernh.) Malme Syns: *Collema myriococcum* (Ach.) Arn. (--Tuckerman 1882. --Mohr 1901. Lawrence. --Nearing 1962); *L. myriococcum* (Ach.) T. Fr. (--Fink 1935. Alabama)

L. UMBELLA (Tuck.) Zahlbr. (--Fink 1935. Alabama) Syns: *Collema umbella* (Tuck.) Nyl. (--Nearing 1962); *Omphalaria umbella* Tuck. (--Tuckerman 1872, 1882. --Mohr 1901. Lawrence)

**LEPRARIA** Ach.

L. CAESIOALBA (de Lesd.) J. R. Laundon (--R. C. Harris, pers. comm. Marion)

L. ELOBATA Tønsberg (--R. C. Harris, pers. comm. Franklin)

L. LOBIFICANS Nyl. (--Brodo et al. 2001. --R. C. Harris, pers. comm. Bibb, Cherokee, Clay, Franklin, Jackson, Winston) Syn: *Lepraria finkii* (de Lesd.) R. C. Harris (--UNA, Pickens)

L. NEGLECTA (Nyl.) Erichs. (--Brodo et al. 2001)

**LEPROLOMA** Nyl. ex Crombie

L. VOUAUXII (Hue) J. R. Laundon Syn: *Lepraria vouauxii* (Hue) R. C. Harris (--R. C. Harris, pers. comm. Winston)

**LEPTOGIUM** (Ach.) Gray

L. APALACHENSE Nyl. (--Tuckerman 1872, 1882. --Mohr 1901. Lawrence. --Fink 1935. Alabama. --Sierk 1964. Lawrence) Syn: *Collema apalachense* (Nyl.) Tuck. (--Tuckerman 1859)

L. AUSTROAMERICANUM (Malme) C. W. Dodge (--Sierk 1964. Baldwin. --McCullough 1967. St. Clair. --Embry 1977. Perry, Russell, Sumter. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Baldwin, Cherokee, Lee. --UNA, Coosa, Cullman, Pickens, Randolph. --TROY, Crenshaw)

L. AZUREUM (Sw.) Mont. (--Sierk 1964. Baldwin. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Baldwin. --AUA, Covington)

[? *L. burnetiae* C. W. Dodge (--Hale 1979), reports from Alabama probably = L. HIRSUTUM]

L. CHLOROMELUM (Sw.) Nyl. (--Tuckerman 1872, 1882. --Mohr 1901. Lawrence, Lee. --McCullough 1967. Calhoun, Etowah, Talladega. --Hale 1979. --Brodo et al. 2001. --TROY, Crenshaw)

L. CORTICOLA (Taylor) Tuck. (--Sierk 1964. --McCullough 1964, 1967. Cleburne, Shelby, Talladega. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Cleburne)

L. CYANESCENS (Rabenh.) Körber (--McCullough 1962, 1964, 1967. Bibb, Calhoun, Chambers, Cherokee, Chilton, Clay, Cleburne, Coosa, Lee, Jefferson, Randolph, St. Clair, Shelby, Talladega, Tallapoosa. --Sierk 1964. --Embry 1977. Dallas, Greene, Hale, Lowndes, Macon, Marengo, Montgomery, Perry, Pickens, Russell, Sumter. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Baldwin, Bibb, Clay, Cleburne, Dekalb/Marshall, Jackson. --UNA, Barbour, Clarke, Cullman, Walker. --TROY, Pike) Syn: *L. tremelloides* (L. f.) Fr. (--Tuckerman 1872, 1882. --Mohr 1901. Mobile, Winston)

L. DACTYLINUM Tuck. (--Sierk 1964)

L. HIRSUTUM Sierk (--R. C. Harris, pers. comm. Cleburne) {Alabama reports of *L. mychroum* (Ehrh.) Nyl. var. *saturninum* Schaer. by (--Mohr 1901. Etowah, Lawrence, Lee) most probably belong here}

L. JUNIPERINUM Tuck. (--Tuckerman 1882. --Mohr 1901. Winston. --Fink 1935. Alabama. --Sierk 1964. Lawrence)

L. LICHENOIDES (L.) Zahlbr. (--Sierk 1964. Lawrence. --Brodo et al. 2001. --R. C. Harris, pers. comm. Dekalb/Marshall) Syn: *L. lacerum* (Sw.) Fr. (--Tuckerman 1882. --Mohr 1901. Winston)

L. MARGINELLUM (Sw.) Gray (--Tuckerman 1872, 1882. --Mohr 1901. Conecuh. --Fink 1935. Alabama. --Sierk 1964. Baldwin, Conecuh. --McCullough 1967. St. Clair. --Hale 1979. --Brodo et al. 2001)

L. MILLIGRANUM Sierk (--McCullough 1967. Calhoun, St. Clair. --Brodo et al. 2001. --R. C. Harris, pers. comm. Dekalb/Marshall, Marion)

L. PHYLLOCARPUM (Pers.) Mont. (--Sierk 1964. Baldwin. --Brodo et al. 2001)

**LETROUITIA** Hafellner & Bellem.

L. DOMINGENSIS (Pers.) Hafellner & Bellem. Syns: *Heterothecium domingense* (Pers.) Flot. (--Mohr 1901. Mobile); *Lopadium domingense* Pers. (--Fink 1935. Alabama)

L. PARABOLA (Nyl.) R. Sant. & Hafellner (--Brodo et al. 2001)

**LICHINA** C. Agardh

L. WILLEYI (Tuck.) Henssen (--Henssen 1969. Jefferson, Randolph. --R. C. Harris, pers. comm. Dekalb)

**LOBARIA** (Schreber) Hoffm.

[? *L. amplissima* (Scop.) Forss. Syn: *Sticta amplissima* (Scop.) Mass. (--Mohr 1901. Winston)]

L. PULMONARIA (L.) Hoffm. (--Hale 1979)

L. QUERCIZANS Michx. (--Hale 1979) Syn: *Sticta quercizans* (Michx.) Ach. (--Mohr 1901)

L. RAVENELII (Tuck.) Yoshim. (--Jordan 1973. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Lee) Syns: *L. erosa* (Eschw.) Nyl. (--McCullough 1962, 1964, 1967. Jefferson, Lee. --Moore 1969); *Sticta erosa* (Eschw.) Tuck. (--Tuckerman 1882. --Mohr 1901. Lee, Winston. --Fink 1935. Alabama); *Sticta ravenelii* Tuck. (--Tuckerman 1859)

**LOXOSPORA** A. Massal.

L. PUSTULATA (Brodo & Culb.) R. C. Harris (--Brodo et al. 2001. --R. C. Harris, pers. comm. Clay, Cherokee, Dekalb/Marshall, Franklin, Marion, Winston)

**MARONEA** A. Massal.

[? *M. constans* (Nyl.) Hepp (--Fink 1935. Alabama. --UNA, Chambers, Chilton) Syns: *Lecanora berica* (Massal.) Tuck. --Tuckerman 1862); *Rinodina constans* (Nyl.) Tuck. (--Tuckerman 1882. --Mohr 1901. Lawrence)] {Apparently all N. Amer. MARONEA = M. POLYPHAEA, R. C. Harris, ined.}

M. POLYPHAEA H. Magn. (--R. C. Harris, pers. comm. Marion)

**MEDUSULINA** Müll. Arg.

M. NITIDA (Eschw.) Müll. Arg. Syn: *Graphis nitida* (Eschw.) Tuck. (--Tuckerman 1872, 1888. --Mohr 1901. Conecuh. --Fink 1935. Alabama)

**MEGALOSPORA** Meyen

M. PACHYCHEILA (Tuck.) Sipman (--Sipman 1983) Syns: *Bombyliospora pachycheila* (Tuck.) Zahlbr. (--Fink 1935); *Heterothecium pachycheilum* Tuck. (--Tuckerman 1888. --Mohr 1901. Conecuh); *Heterothecium tuberculosum* (Fée) Flot. var. *pachycheilum* Tuck. (--Tuckerman 1872); *Lecidea pachycheila* Tuck. (--Tuckerman 1864)

M. PORPHYRITIS (Tuck.) R. C. Harris (--R. C. Harris, pers. comm. Winston)

M. TUBERCULOSA (Fée) Sipman (--Sipman 1983. --Harris 1984) Syns: *Bombyliospora tuberculosa* (Fée) De Not. (--Fink 1935. Alabama); *Heterothecium tuberculosum* (Fèe) Flot. (--Tuckerman 1888. --Mohr 1901. Conecuh); *Heterothecium tuberculosum* (Fée) Flot. var. *pachycarpum* (Del.) Tuck. (--Tuckerman 1872.)

**MELANELIA** Essl.
M. CULBERSONII (Hale) Thell Syn: *Cetraria culbersonii* Hale (Hale 1979)
[? *M. exasperata* (De Not.) Essl. Syn: *Parmelia exasperata* De Not. (--Hale 1979)]
M. HALEI (Ahti) Essl. Syn: *Parmelia halei* Ahti (--Hale 1967. --Hale 1979)
M. SUBAURIFERA (Nyl.) Essl. Syn: *Parmelia subaurifera* Nyl. (--Hale 1979)

**MELASPILEA** Nyl.
M. TRIBULOIDES (Tuck.) Müll. Arg. Syn: *Opegrapha tribulodes* Tuck. (--Tuckerman 1872, 1888. --Mohr 1901. Conecuh, Mobile) {lichenicolous fungi}

**MENEGAZZIA** A. Massal.
M. TEREBRATA (Hoffm.) A. Massal. (--Hale 1979)

**METAMELAENA** Henssen
M. MELAMBOLA (Tuck.) Henssen (--Henssen 1989) Syns: *Pyrenopsis melambola* (Tuck.) Tuck. (--Tuckerman 1882. --Mohr 1901. Lawrence. --Fink 1935); *Synalissa melambola* Tuck. (--Tuckerman 1877)

**MICAREA** Fr.
M. ERRATICA (Körber) Hertel, Rambold & Pietschmann (--R. C. Harris, pers. comm. Cherokee, Jackson, Marion)
M. LITHINELLA (Nyl.) Hedl. (--R. C. Harris, pers. comm. Cherokee)
M. MELAENA (Nyl.) Hedl. (--R. C. Harris, pers. comm. Cherokee)
M. NEOSTIPITATA Coppins & P. May (--R. C. Harris, pers. comm. Cherokee)
M. PELIOCARPA (Anzi) Coppins & R. Sant. (--Brodo et al. 2001. --R. C. Harris, pers. comm. Marion, Winston)
M. PRASINA Fr. (--R. C. Harris, pers. comm. Dekalb/Marshall, Winston)

**MINUTOEXCIPULA** Atienza & D. Hawksw.
M. TUCKERAE Atienza & D. Hawksw. (--R. C. Harris, pers. comm. Dekalb/Marshall) {lichenicolous fungi}

**MYCOCALICIUM** Vainio
M. ALBONIGRUM (Nyl.) Fink (--Fink 1935. Alabama) Syns: *Calicium albonigrum* Nyl. (--Mohr 1901. Conecuh); *Calicium parietinum* Ach. var. *albonigrum* Nyl. (--Tuckerman 1872)

MYCOMICROTHELIA Keissler
[*M. thelena* (Ach.) D. Hawksw. (--Tuckerman 1872. --Mohr 1901. Lawrence, Lee) Syn: *Pyrenula thelaena* (Ach.) Tuck., but not found in North America, Esslinger 2002]

**MYCOPORUM** Flotow ex Nyl.
M. ACERVATUM R. C. Harris (--Harris 1995. Conecuh)
M. ESCHWEILERI (Müll. Arg.) R. C. Harris Syn: *Tomasellia eschweileri* (Müll. Arg.) R. C. Harris (--Harris 1975. Baldwin)
M. LACTEUM (Ach.) R. C. Harris Syn: *Tomasellia lactea* (Ach.) R. C. Harris (--Harris 1975. Baldwin)

**MYELOCHROA** (Asah.) Elix & Hale
M. AURULENTA (Tuck.) Elix & Hale (--Brodo et al. 2001. --R. C. Harris, pers. comm. Bibb, Cherokee, Clay, Cleburne, Dekalb/Marshall, Lee, Tallapoosa) Syns: *Parmelia aurulenta* Tuck. (--Tuckerman 1858. --Mohr 1901. Conecuh, Lawrence. --Fink 1935. --McCullough 1962, 1964, 1967. Bibb, Calhoun, Chambers, Cherokee, Chilton, Clay, Cleburne, Coosa, Etowah, Jefferson, Lee, Randolph, St. Clair, Talladega, Tallapoosa. --Dey 1977. --Embry 1977. Dallas, Hale, Lowndes, Macon, Marengo, Montgomery, Perry, Pickens, Sumter. --UNA, Geneva); *Parmelina aurulenta* (Tuck.) Hale (--Hale 1976c)

M. GALBINA (Ach.) Elix & Hale (--Brodo et al. 2001) Syns: *Parmelia galbina* Ach. (--Culberson 1961. Lee. --McCullough 1962, 1964, 1967. Bibb, Chambers, Chilton, Cleburne, Jefferson, St. Clair, Tallapoosa. --Dey 1977. --Embry 1977. Dallas, Lowndes, Perry); *Parmelina galbina* Ach. (--Hale 1976c. --Hale 1979)

M. OBSESSA (Ach.) Elix & Hale (--Brodo et al. 2001. --R. C. Harris, pers. comm. Clay, Dekalb/Marshall) Syns: *Parmelia obsessa* Ach. (--McCullough 1962, 1967. Calhoun, Clay, Coosa, Etowah, Jefferson, St. Clair, Talladega); *Parmelina obsessa* Ach. (--Hale 1976c. --Hale 1979)

**MYRIOTREMA** Fée

M. GLAUCESCENS (Nyl.) Hale Syns: *Leptotrema glaucescens* (Nyl.) Müll. Arg. (--Fink 1935. Alabama); *Thelotrema glaucescens* Nyl. (--Tuckerman 1872, 1882. --Mohr 1901. Conecuh)

M. RUGIFERUM (Harm.) Hale (--Brodo et al. 2001)

M. SUBCOMPUNCTUM (Nyl.) Hale (--R. C. Harris, pers. comm. Dekalb/Marshall. --UNA, Conecuh)

M. WIGHTII (Taylor) Hale Syn: *Thelotrema ravenelii* Tuck. (--Tuckerman 1858, 1872, 1882. --Mohr 1901. Conecuh, Lawrence)

**MYXOBILIMBIA** Hafellner

M. SABULETORUM (Schreber) Hafellner Syn: *Bacidia sabuletorum* (Schreber) Lettau (--Fink 1935. --R. C. Harris, pers. comm. Dekalb/Marshall)

**NADVORNIKIA** Tibell

N. SOREDIATA R. C. Harris (--R. C. Harris, pers. comm. Winston)

**NAETROCYMBE** Körber {non-lichenized}

N. PUNCTIFORMIS (Pers.) R. C. Harris Syn: *Pyrenula punctiformis* (Ach.) Naeg. & Hepp. (--Mohr 1901. Mobile)

**NEPHROMA** Ach.

N. HELVETICUM Ach. (--Tuckerman 1882. --Mohr 1901. Winston. --Fink 1935. --McCullough 1964, 1967. Calhoun, Chilton, St. Clair. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Dekalb/Marshall)

**NORMANDINA** Nyl.

N. PULCHELLA (Borrer) Nyl. (--Culberson & Hale 1966. --Brodo et al. 2001. --UNA, Lawrence)

**OCELLULARIA** G. Meyer

O. GRANULOSA (Tuck.) Zahlbr. (--Brodo et al. 2001)

**OCHROLECHIA** A. Massal.

O. AFRICANA Vainio (--Brodo 1991. Baldwin, Mobile. --Brodo et al. 2001. --R. C. Harris, pers. comm. Bibb, Cherokee, Clay, Lee, Marion. --UNA, Tuscaloosa)

[*O. parella* (L.) A. Massal. (--Howard 1970. Lee), not in North America, Esslinger 2002]

O. PSEUDOPALLESCENS Brodo (--R. C. Harris, pers. comm. Clay, Franklin)

O. YASUDAE Vainio (--Brodo et al. 2001. --R. C. Harris, pers. comm. Dekalb/Marshall)

**OPEGRAPHA** Ach.

O. RUPESTRIS Pers. (--R. C. Harris, pers. comm. Blount, Colbert) [lichenicolous fungi, Esslinger 2002]

O. VARIA Pers. (--Mohr 1901. --Brodo et al. 2001. --R. C. Harris, pers. comm. Cleburne)

O. VIRIDIS (Pers. ex Ach.) Behlen & Desberger (--R. C. Harris, pers. comm. Cleburne)

O. VULGATA Ach. (--Mohr 1901. --R. C. Harris, pers. comm. Baldwin, Cleburne, Lee)

**PANNARIA** Delise

P. CONOPLEA (Ach.) Bory Syn: *Pannaria pityrea* (DC.) Degel. (--McCullough 1964, 1967. Calhoun, Cherokee, Chilton, Jefferson, Lee, Randolph, St. Clair)

P. LURIDA (Mont.) Nyl. (--McCullough 1964, 1967. Calhoun, Cleburne, St. Clair, Tallapoosa. --Hale 1979. --Brodo et al. 2001) Syn: *Physma luridum* (Mont.) Tuck. (--Tuckerman 1882. --Mohr 1901. Lawrence)

P. LURIDA (Mont.) Nyl. ssp. QUERCICOLA P. M. Jørg. (--R. C. Harris, pers. comm. Cleburne)

P. MARIANA (Fr.) Müll. Arg. (--McCullough 1967. Talladega. --Fink 1935. Alabama) Syn: *P. pannosa* (Sw.) Delise (--Mohr 1901. Mobile)

[*P. molybdaea* (Pers.) Tuck. (--Tuckerman 1882. --Mohr 1901. Conecuh, Mobile) =COCCOCARPIA PELLITA (Ach.) Müll. Arg., misidentifications for North America, but known from Cuba & Mexico, Esslinger 2002]

[*P. nigrocincta* Nyl. (--Mohr 1901. Mobile) =PARMELIELLA NIGROCINCTA (Mont.) Mull. Arg.; a tropical/subtropical species, prob. misidentification for North America, Esslinger pers. comm.]

P. RUBIGINOSA (Ach.) Bory (--Tuckerman 1882. --Mohr 1901. Lawrence. --McCullough 1964, 1967. Calhoun, Coosa, St. Clair, Talladega. --Hale 1979)

P. TAVARESII P. M. Jørg. (--Hale 1979. --Brodo et al. 2001)

**PARMELIA** Ach.

[? *P. saxatilis* (L.) ACH. (--Mohr 1901. Lee, Mobile. --McCullough 1964, 1967. Clay, Cleburne, Talladega)]

P. SQUARROSA Hale (--Hale 1979, 1987. --Hinds 1998. --Brodo et al. 2001)

**PARMELIELLA** Müll. Arg.

P. PANNOSA (Sw.) Nyl. (--Hale 1979)

P. TRIPTOPHYLLA (Ach.) Müll. Arg. (--Hale 1979) Syn: *Pannaria tryptophylla* (Ach.) Mass. (--Mohr 1901. Lawrence, Mobile)

PARMELINA Hale

[? *P. quercina* (Willd.) Hale Syn: *Parmelia tiliacea* (Hoffm.) Flörke. (--Mohr 1901. Lee, Mobile)], old records commonly = either HYPOTRACHYNA LIVIDA or MYELOCHROA GALBINA (R. C. Harris, pers. comm.)]

**PARMELINOPSIS** Elix & Hale

P. HORRESCENS (Taylor) Elix & Hale (--Brodo et al. 2001. --R. C. Harris, pers. comm. Dekalb, Franklin, Marion) Syns: *Parmelia horrescens* Taylor (--McCullough 1967. Calhoun, Etowah, Jefferson, St. Clair, Shelby. --Embry 1977. Marengo. --UNA, Escambia); *Parmelina horrescens* (Taylor) Hale (--Hale 1976c. --Hale 1979)

P. MINARUM (Vainio) Elix & Hale (--Brodo et al. 2001. --R. C. Harris, pers. comm. Clay, Jackson, Marion) Syns: *Parmelia dissecta* Nyl. (--McCullough 1964, 1967. Chambers, Cherokee, Clay, Cleburne, Coosa, Jefferson, Randolph, Shelby, Talladega. --Dey 1977. --Embry 1977. Dallas, Lowndes, Russell); *Parmelia hubrichtii* E. C. Berry (--McCullough 1962. Jefferson); *Parmelina dissecta* Nyl. (--Hale 1976c. --Hale 1979)

P. SPUMOSA (Asah.) Elix & Hale (--Brodo et al. 2001)

**PARMELIOPSIS** Nyl.

P. SUBAMBIGUA Gyel. (--Hale 1979. --R. C. Harris, pers. comm. Clay, Cleburne, Franklin) {Alabama reports of P. AMBIGUA (restricted to North Temperate/Boreal zones) by (--Riddle 1917. --McCullough 1962, 1964, 1967. Calhoun, Chilton, Coosa, Jefferson, Randolph, St. Clair, Shelby, Talladega, Tallapoosa. --Brodo 1968), probably belong here}

**PARMOTREMA** A. Massal.

P. ARNOLDII (Du Rietz) Hale (--Brodo et al. 2001)

P. AUSTROSINENSE (Zahlbr.) Hale (--Hale 1979. --Brodo et al. 2001)

P. CHINENSE (Osbeck) Hale & Ahti (--Brodo et al. 2001. --R. C. Harris, pers. comm. Clay) Syns: *Parmelia perlata* (L.) Ach. (--Mohr 1901. Etowah, Winston. --Embry 1977. Perry); *P. perlatum* (Hudson) M. Choisy (--Hale 1979)

P. CRINITUM (Ach.) M. Choisy (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Cleburne, Marion) Syn: *Parmelia crinita* Ach. (--Mohr 1901. Lee. --Hale 1965. Shelby, Pike. --McCullough 1962, 1964, 1967. Bibb, Calhoun, Cherokee, Etowah, Jefferson, Randolph, St. Clair, Shelby, Talladega, Tallapoosa. --Embry 1977. Hale, Perry. --UNA, Coosa)

P. CRISTIFERUM (Taylor) Hale (--Hale 1979. --Brodo et al. 2001)

[? *P. dilatatum* (Vainio) Hale (--Hale 1979. --Brodo et al. 2001)]

P. ENDOSULPHUREUM (Hillm.) Hale (--Hale 1979. --Brodo et al. 2001) Syn: *Parmelia endosulphurea* (Hillm.) Hale (--Hale 1965. Pike)

P. EURYSACUM (Hue) Hale (--Kurokawa 2001. Calhoun)

P. HYPOTROPUM (Nyl.) Hale (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Cherokee, Cleburne, Marion, Winston. --UNA, Barbour, Fayette) Syn: *Parmelia hypotropa* Nyl. (--Hale 1965. Dekalb. --McCullough 1962, 1964, 1967. Chambers, Clay, Etowah, Jefferson, St. Clair, Shelby. --Embry 1977. Greene, Hale. --UNA, Conecuh)

P. INTERNEXUM (Nyl.) Hale Syn: *Parmelia internexa* Nyl. (--McCullough 1964. Chilton, Clay, Randolph. --UNA, Coosa)

P. LOUISIANAE (Hale) Hale (--UNA, Clay)

P. MADAGASCARIACEUM (Hue) Hale (--R. C. Harris, pers. comm. Clay) Syn: *Parmelia madagascariacea* (Hue) Abb. (--Hale 1959b. Dekalb. --McCullough 1964, 1967. Calhoun, Cleburne, Talladega, Tallapoosa)

P. MELLISSII (C. W. Dodge) Hale (--Hale 1979. --R. C. Harris, pers. comm. Clay) Syns: *Parmelia allardii* Hale (--Hale 1959b. Cleburne); *Parmelia mellissii* C. W. Dodge (--Hale 1965. Winston. --McCullough 1967. Bibb, Cherokee, Talladega. --Embry 1977. Lowndes, Macon, Russell)

P. PERFORATUM (Jacq.) Mass. (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Cherokee. --UNA, Barbour, Choctaw, Fayette. --AUA, Montgomery, Pike, Tuscaloosa. --TROY, Bullock, Butler, Crenshaw, Dale, Henry) Syns: *Parmelia hypotropoides* Nyl. ex Willey (--Hale 1957. Cleburne, Dallas, Dekalb, St. Clair, Shelby, Sumter); *Parmelia perforata* (Jacq.) Ach. (--Mohr 1901. --McCullough 1962, 1964, 1967. Bibb, Calhoun, Chambers, Cherokee, Chilton, Clay, Cleburne, Coosa, Etowah, Jefferson, Lee, Randolph, St. Clair, Shelby, Talladega, Tallapoosa. --Dey 1977. --Embry 1977. Bullock, Dallas, Greene, Hale, Lowndes, Macon, Marengo, Montgomery, Perry, Pickens, Russell, Sumter. --UNA, Blount, Conecuh, Covington, Dale, Geneva, Houston, Walker)

P. PERMACULATUM (Hale) Kurok. Syn: *Parmelia permaculata* Hale (--Hale 1971. --Kurokawa 2001. Mobile)

P. PRAESOREDIOSUM (Nyl.) Hale (--Hale 1979. --Brodo et al. 2001) Syns: *Parmelia praesorediosa* Nyl. (--Hale 1965. Houston. --Embry 1977. Bullock, Dallas, Greene, Lowndes, Macon, Montgomery, Perry, Russell, Sumter); *Parmelia santae-crucis* Vainio (--Hale 1959a. Baldwin)

P. RAMPODDENSE (Nyl.) Hale (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Dekalb/Marshall) Syns: *Parmelia rampoddensis* Nyl. (--Hale 1965. Pike. --McCullough 1964, 1967. Chilton, Shelby, Talladega. --Embry 1977. Greene, Lowndes, Marengo, Perry, Pickens); *Parmelia subinvoluta* Hale (--Hale 1959b. Mobile)

P. RIGIDUM (Lynge) Hale Syn: *Parmelia rigida* Lynge (--Hale 1965. Baldwin, Mobile)

P. STUPPEUM (Taylor) Hale (--Hale 1979)

P. SUBMARGINALE (Michx.) DePriest & B. Hale (--AUA, Tuscaloosa) Syns: *Parmelia epiclada* Hale (--Hale 1959b. St. Clair. --McCullough 1962, 1964. Chambers, Cleburne, Coosa, Jefferson, Lee, Tallapoosa); *Parmelia michauxiana* Zahlbr. (--McCullough 1967. Calhoun, Etowah, Jefferson, St. Clair, Shelby. --Embry 1977. Bullock, Dallas, Greene, Hale, Lowndes, Macon, Marengo, Montgomery, Perry, Pickens, Russell, Sumter. --UNA, Cleburne, Conecuh, Pike, Tuscaloosa); *P. michauxianum* (Zahlbr.) Hale (--Hale 1979. --Brodo et al. 2001. --UNA, Choctaw)

P. SULPHURATUM (Nees & Flotow) Hale (--Hale 1979. --Brodo et al. 2001. --TROY, Covington)

P. TINCTORUM (Delise ex Nyl.) Hale (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Bibb, Clay, Cleburne. --AUA, Pike. --TROY, Butler, Covington, Henry, Montgomery) Syn:

*Parmelia tinctorum* Delise ex Nyl. (--Hale 1965. Houston, Mobile, Pike, Shelby, Sumter. --McCullough 1962, 1964, 1967. Bibb, Coosa, Jefferson, Randolph, St. Clair, Shelby, Talladega. --Embry 1977. Bullock, Dallas, Greene, Hale, Lowndes, Macon, Marengo, Montgomery, Perry, Russell, Sumter. --UNA, Conecuh, Tuscaloosa, Walker)

P. ULTRALUCENS (Krog) Hale (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Bibb, Clay. --AUA, Lee) Syns: *Parmelia subcrinita* Nyl. (--Hale 1965. Cleburne, Shelby, Tuscaloosa. --McCullough 1962, 1964, 1967. Calhoun, Cherokee, Chilton, Coosa, Jefferson, Lee, Randolph, Shelby, Talladega. --Embry 1977. Bullock, Dallas, Lowndes, Macon, Marengo, Montgomery, Perry, Russell, Sumter); *Parmelia ultralucens* Krog (--Krog 1974) {This name has recently been published as CANOMACULINA ULTRALUCENS (Krog) Elix & J.B. Chen *comb. nov.*, see Chen et al. 2003)}

P. XANTHINUM (Müll. Arg.) Hale (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Cleburne. --TROY, Crenshaw) Syn: *Parmelia xanthina* (Müll. Arg.) Vainio (--Hale 1965. Shelby)

**PELTIGERA** Willd.

P. CANINA (L.) Willd. (--Mohr 1901. Dekalb, Lee, Mobile. --Fink 1935. --McCullough 1962, 1964. Clay, Cleburne, Jefferson, Tallapoosa. --Hale 1979. --Brodo et al. 2001)

P. EVANSIANA Gyel. (--Hale 1979)

P. HORIZONTALIS (Hudson) Baumg. (--Hale 1979) Syn: *P. horizontalis* (Hudson) Baumg. var. *typica* f. *lacinulata* Gyel. (--Thomson 1950. Tallapoosa)

P. PHYLLIDIOSA Goffinet & Miadlikowska (--Goffinet & Miadlikowska 1999. Dekalb. --R. C. Harris, pers. comm. Cherokee, Dekalb/Marshall, Winston)

P. POLYDACTYLON (Necker) Hoffm. (--Tuckerman 1882. "Southern States" --Mohr 1901. Etowah, Henry, Mobile, Winston. --Fink 1935. --Thomson 1950. Lee. --McCullough 1962, 1967. Jefferson, St. Clair, Shelby. --Embry 1977. Marengo, Perry. --Hale 1979. --UNA, Coffee. --TROY, Montgomery, Pike)

P. PRAETEXTATA (Flörke ex Sommerf.) Zopf (--Brodo et al. 2001. --R. C. Harris, pers. comm. Cherokee)

P. RUFESCENS (Weiss) Humb. Syn: *P. canina* (L.) Willd. var. *rufescens* (Weiss) Mudd (--Thomson 1950. Lee, Tallapoosa. --McCullough 1967. Jefferson, St. Clair, Shelby)

**PELTULA** Nyl.

P. EUPLOCA (Ach.) Poelt (--Wetmore 1970)

P. TORTUOSA (Nees) Wetmore (--Wetmore 1970. Randolph, St. Clair) Syn: *Heppia tortuosa* (Nees) Vainio (--Henssen 1970. Randolph, St. Clair)

**PERTUSARIA** DC.

P. AMARA (Ach.) Nyl. (--Dibben 1980. Lee. --Brodo et al. 2001. --R. C. Harris, pers. comm. Dekalb/Marshall)

[*P. communis* DC. (--Tuckerman 1882. --Mohr 1901) =*Pertusaria pertusa* (Weigel) Tuck., misidentifications for North America, Esslinger 2002]

P. COPIOSA Erichs. (--Dibben 1980. --UNA, Conecuh, Covington)

P. EPIXANTHA R. C. Harris (--R. C. Harris, pers. comm. Bibb)

P. GLOBULARIS (Ach.) Tuck. (--Tuckerman 1882. --Mohr 1901. Lawrence. --Fink 1935. Alabama. --Dibben 1980. Cleburne. --R. C. Harris, pers. comm. Clay)

[? *P. hymenea* (Ach.) Schaerer Syn: *P. wulfenii* DC. (--Mohr 1901. Mobile)]

P. HYPOTHAMNOLICA Dibben (--Dibben 1980. Lawrence, Marshall, Mobile, Tuscaloosa)

P. LEIOPLACA DC. (--Tuckerman 1882. --Mohr 1901) Syn: *P. leucostoma* A. Massal. (--Dibben 1980. Conecuh)

[*P. multipuncta* (Turner) Nyl. (--Mohr 1901. Mobile), misidentifications for North America, Esslinger 2002]

P. MULTIPUNCTOIDES Dibben (--Dibben 1980. --R. C. Harris, pers. comm. Cleburne, Dekalb/Marshall)

P. NEOSCOTICA Lamb (--Dibben 1980. Randolph)

P. OSTIOLATA Dibben (--Dibben 1980. Bibb, Calhoun, Dallas, Fayette, Marshall. --UNA, Clay, Randolph)

P. PARATUBERCULIFERA Dibben (--Dibben 1980. Fayette, Lawrence, Lee, Mobile, Tuscaloosa. --Brodo et al. 2001. --R. C. Harris, pers. comm. Bibb, Clay, Dekalb/Marshall) {Alabama reports of *P. tuberculifera* Nyl. (--UNA, Coosa, Jefferson) most probably belong here, Esslinger 2002}

P. PLITTIANA Erichs. (--Dibben 1980. Clay, Lawrence, Madison, Winston. --Brodo et al. 2001. --R. C. Harris, pers. comm. Clay, Dekalb/Marshall, Jackson, Winston)

P. PROPINQUA Müll. Arg. (--R. C. Harris, pers. comm. Clay)

P. PUSTULATA (Ach.) Duby (--Tuckerman 1882. --Mohr 1901. Lee, Mobile. --Dibben 1980. Conecuh, Madison)

P. PUSTULATA (Ach.) Duby var. EVANSII Erichs. (--Erichsen 1941. Baldwin) {Status questionable according to Dibben 1980}

P. SINUSMEXICANI Dibben (--Dibben 1980. Lee. --R. C. Harris, pers. comm. Bibb, Dekalb/Marshall)

P. SUBPERTUSA Brodo (--Dibben 1980. Lawrence. --Brodo et al. 2001)

P. TETRATHALAMIA (Fée) Nyl. (--Dibben 1980. Baldwin, Lawrence, Lee. --UNA, Chilton, Covington, Randolph, Tuscaloosa, Walker)

P. TEXANA Müll. Arg. (--Dibben 1980. Calhoun, Dallas, Escambia, Lee, Tuscaloosa. --Brodo et al. 2001. --R. C. Harris, pers. comm. Baldwin, Clay, Marion, Winston. --UNA, Chilton, Coosa, Henry)

P. TRACHYTHALLINA Erichs. (--Dibben 1980. Baldwin. --Brodo et al. 2001)

P. VELATA (Turner) Nyl. (--Tuckerman 1882. --Mohr 1901. --Dibben 1980. Baldwin, Clay, Fayette, Lawrence, Mobile, Tallapoosa. --Brodo et al. 2001. --R. C. Harris, pers. comm. Baldwin, Clay, Lee. --UNA, Coosa)

P. XANTHODES Müll. Arg. (--Dibben 1980. Mobile. --Brodo et al. 2001. --UNA, Chilton)

**PHAEOGRAPHINA** Müll. Arg.

P. CAESIOPRUINOSA (Fée) Müll. Arg. (--Brodo et al. 2001. --UNA, Conecuh) Syns: *Graphis scalpturata* Ach. (--Tuckerman 1872. --Mohr 1901. Conecuh); *P. scalpturata* (Ach.) Müll. Arg. (--Fink 1935. Alabama)

P. EXPLICANS Fink (--Hedrick 1933. Montgomery. --Fink 1935. Alabama)

**PHAEOGRAPHIS** Müll. Arg.

P. DENDRITICA (Ach.) Müll. Arg. (--UNA, Randolph) Syn: *Graphis dendritica* Ach. (--Tuckerman 1872. --Mohr 1901. Conecuh, Lawrence, Mobile)

P. PATELLULA (Fèe) Müll. Arg. (--C. M. Wetmore, pers. comm. Mobile)

P. PUNCTIFORMIS (Eschw.) Müll. Arg. (--C. M. Wetmore, pers. comm. Mobile)

**PHAEOPHYSCIA** Moberg

P. ADIASTOLA (Essl.) Essl. (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Cherokee, Winston)

P. CERNOHORSKYI (Nádv.) Essl. (--Hale 1979. --Brodo et al. 2001)

P. CILIATA (Hoffm.) Moberg (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Baldwin. --AUA, Lee) Syns: *Physcia ciliata* (Hoffm.) Du Rietz (--Thomson 1963. Baldwin, Clay, Lee, Dallas, St. Clair. --McCullough 1962, 1967. Calhoun, Jefferson, St. Clair, Talladega. --Dey 1977. --Embry 1977. Bullock, Lowndes, Macon, Marengo, Montgomery, Sumter)

P. HISPIDULA (Ach.) Essl. Syn: *P. imbricata* (Vainio) Essl. (--Hale 1979)

[? *P. orbicularis* (Necker) Moberg Syn: *Physcia orbicularis* (Necker) Poetsch (--Thomson 1963. Covington. --McCullough 1962, 1964, 1967. Bibb, Chambers, Cherokee, Clay, Coosa, Etowah, Jefferson, St. Clair, Shelby, Talladega, Tallapoosa. --Embry 1977. Bullock, Dallas, Hale, Macon, Marengo, Sumter)]

P. PUSILLOIDES (Zahlbr.) Essl. (--Hale 1979. --Brodo et al. 2001)

P. RUBROPULCHRA (Degel.) Essl. (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Cherokee, Dekalb/Marshall. --UNA, Jefferson, Walker) Syns: *Physcia endochrysea* (Hampe)

Nyl. (--Fink 1935. Alabama); *Physcia obscura* (Ehrh.) Hampe var. *endochrysea* Nyl. (--Mohr 1901. Lawrence); *Physcia orbicularis* (Necker) Poetsch f. *rubropulchra* Degel. (--Thomson 1963. Cleburne, Dekalb, St. Clair, Shelby)

P. SQUARROSA Kashiwadani (--R. C. Harris, pers. comm. Dekalb/Marshall) Syn: *Physcia lacinulata* Müll. Arg. (--McCullough 1964, 1967. Chambers, Cherokee, Chilton, Jefferson, St. Clair. --Embry 1977. Hale) {for North American records, Esslinger 2002}

**PHLYCTIDIA** Müll. Arg.

P. LUDOVICIENSIS Müll. Arg. (--R. C. Harris, pers. comm. Bibb, Marion)

**PHYLLOPSORA** Müll. Arg.

P. CORALLINA (Eschw.) Müll. Arg. var. CORALLINA (--Brako 1991. Monroe. --R. C. Harris, pers. comm. Cherokee)

P. CORALLINA (Eschw.) Müll. Arg. var. SANTENSIS (Tuck.) Brako (--Brako 1991. Baldwin)

P. PARVIFOLIA Pers. (--Brodo et al. 2001. --R. C. Harris, pers. comm. Dekalb/Marshall) Syns: *Biatora parvifolia* (Pers.) Tuck. (--Tuckerman 1888. --Mohr 1901. Mobile); *Lecidea santensis* Tuck. (--Tuckerman 1858)

P. PARVIFOLIA (Pers.) Müll Arg. var. BREVIUSCULA (Nyl.) Brako (--Brako 1991. Baldwin. --Harris 1995)

P. PARVIFOLIA (Pers.) Müll Arg. var. PARVIFOLIA (--Brako 1991. Mobile)

**PHYSCIA** (Schreber) Michx.

[? *P. aipolia* (Ehrh. ex Humb.) Fürnr. (--Thomson 1963. Tuscaloosa. --McCullough 1964, 1967. Calhoun, Cherokee, Cleburne, Tallapoosa. --Embry 1977. Dallas, Hale, Macon, Marengo, Montgomery, Perry, Sumter. --Hale 1979. --Brodo et al. 2001. --UNA, Henry, Pike. --TROY, Crenshaw) Syn: *P. stellaris* (L.) Nyl. var. *aipolia* Schaer. (--Tuckerman 1860). Older records = P. NEOGAEA, P. PUMILIOR or are misidentifications of
P. STELLARIS (R. C. Harris, pers. comm.)]

[*P. alba* (Fée) Müll. Arg. var. *obsessa* (Mont.) J. W. Thomson (--Thomson 1963. Baldwin, Hale. --McCullough 1967. Jefferson, St. Clair) =PHYSCIA INTEGRATA Nyl., but misidentifications for North America, Esslinger 2002] {Alabama reports most likely = P. NEOGAEA, R. C. Harris, pers. comm.}

P. AMERICANA G. Merr. (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Cherokee. --TROY, Conecuh) Syn: *P. tribacoides* auct. non Nyl. (--Thomson 1963. Baldwin, Cleburne, Crenshaw, Mobile, St. Clair. --McCullough 1962, 1964, 1967. Bibb, Calhoun, Chambers, Cherokee, Chilton, Clay, Coosa, Etowah, Jefferson, Lee, Randolph, St. Clair, Shelby, Talladega, Tallapoosa. --Embry 1977. Dallas, Hale, Marengo, Montgomery, Russell, Sumter)

P. ATROSTRIATA Moberg (--Brodo et al. 2001) Syn: *P. albicans* sensu J. W. Thomson (--Thomson 1963. Baldwin, Crenshaw, Dallas, Mobile. --McCullough 1964, 1967. Chambers, Cherokee, Lee, Randolph, St. Clair, Talladega. --Embry 1977. Sumter) {for North American reports, Esslinger 2002}

P. CRISPA Nyl. (--Mohr 1901. On trees. Mobile. --Hale 1979. --UNA, Coosa) {many old records using this name are actually =PHYSCIA ATROSTRIATA Moberg, Esslinger 2002}

[*P. culbersonii* (--McCullough 1962. Jefferson), *nomen nudum* for *Physcia lacinulata*, Alabama reports probably = PHAEOPHYSCIA SQUARROSA, Esslinger pers. comm.]

[*P. grisea* (Lam.) Zahlbr. (--McCullough 1964, 1967. Cherokee, Coosa, Randolph) =PHYSCONIA GRISEA (Lam.) Poelt, but misidentifications for North America, Esslinger 2002]

P. HALEI J. W. Thomson (--Hale 1979)

P. MILLEGRANA Degel. (--Hale 1979. --Brodo et al. 2001. --TROY, Crenshaw) {Alabama reports of *P. asteroidea* (Fr.) Nyl. (--Tuckerman 1882. --Mohr 1901. Lawrence) and *P. stellaris* (L.) Nyl. var. *astroidea* Tuck. (--Tuckerman 1860) most probably belong here}

P. NEOGAEA R. C. Harris (--Brodo et al. 2001)

P. PHAEA (Tuck.) J. W. Thomson (--Hale 1979. --Brodo et al. 2001)

P. PSEUDOSPECIOSA J. W. Thomson (--Hale 1979)

P. PUMILIOR R. C. Harris (--Brodo et al. 2001. --R. C. Harris, pers. comm. Lee, Marion)

P. SOREDIOSA (Vainio) Lynge (--Hale 1979. --Brodo et al. 2001)

P. STELLARIS (L.) Nyl. (--Mohr 1901. Lawrence, Mobile. --Thomson 1963. Lee, St. Clair. --McCullough 1964, 1967. Calhoun, Chambers, Cherokee, Coosa, Lee, Randolph, St. Clair, Talladega. --Embry 1977. Macon. -- Hale 1979. --Brodo et al. 2001. --UNA, Chilton, Tuscaloosa. --TROY, Pike)

P. SUBTILIS Degel. (--McCullough 1967. Calhoun, Cherokee, St. Clair, Talladega. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Clay, Dekalb/Marshall, Jackson, Marion)

**PHYSCIELLA** Essl.

P. CHLOANTHA (Ach.) Essl. (--Brodo et al. 2001) Syn: *Physcia chloantha* (Ach.) Vainio (--Hale 1979)

**PICCOLIA** A. Massal.

P. CONSPERSA (Fée) Vainio Syns.: *Biatorella conspersa* (Fèe) Vainio (--Fink 1935); *Heterothecium conspersum* (Fée) Flot. (--Tuckerman 1872, 1888. --Mohr 1901. Conecuh)

**PLACIDIUM** A. Massal.

P. CHILENSE (Räsänen) Breuss Syn: *Catapyrenium chilense* (Räsänen) Breuss (--R. C. Harris, pers. comm. Marion)

P. LACINULATUM (Ach.) Breuss (--Brodo et al. 2001) Syn: *Catapyrenium lachneum* (Ach.) R. Sant. (--Thomson 1987), *Dermatocarpon lachneum* (Ach.) A. L. Sm. (--UNA, Pickens); *Endocarpon hepaticum* Ach. (--R. C. Harris, pers. comm., housed at BUF)

P. SQUAMULOSUM (Ach.) Breuss (--R. C. Harris, pers. comm.) {Reports from Alabama of *Dermatocarpon hepaticum* (Ach.) T. Fries (McCullough 1964, 1967 Calhoun, Lee), most likely belong here}

P. TUCKERMANII (Ravenel ex Mont.) Breuss (--Brodo et al. 2001. --R. C. Harris, pers. comm. Lee) Syns: *Catapyrenium tuckermanii* (Rav. ex Mont.) J. W. Thomson (--Thomson 1987); *Dermatocarpon tuckermanii* (Rav. ex Mont.) Zahlbr. (--Hale 1956. --McCullough 1964, 1967. Cherokee, Coosa, Jefferson, St. Clair, Talladega, Tallapoosa. --Hale 1979. --UNA, Chilton, Cullman, Randolph); *Endocarpon arboreum* Schw. (--Mohr 1901. Lawrence)

**PLACYNTHIELLA** Elenkin

P. OLIGOTROPHA (J. R. Laundon) Coppins & P. James (--R. C. Harris, pers. comm. Marion)

**PLACYNTHIUM** (Ach.) Gray

P. NIGRUM (Huds.) S. F. Gray (--Hale 1979. --Brodo et al. 2001) Syns: *Pannaria nigra* (Huds.) Nyl. (--Tuckerman 1872, 1882. --Mohr 1901. Lawrence); *P. nigrum* (Huds.) S. F. Gray var. *nigrum* (--Henssen 1963a. Lawrence)

P. PETERSII (Nyl.) Burnham (--Henssen 1963a. Lawrence. --R. C. Harris, pers. comm. Blount) Syns: *Pannaria petersii* Tuck. (--Tuckerman 1872, 1882. --Mohr 1901. Lawrence); *Pterygium petersii* Nyl. (--Fink 1935. Alabama)

P. STENOPHYLLUM (Tuck.) Fink (--Fink 1935. Alabama) Syns: *Pannaria stenophylla* Tuck. (--Tuckerman 1877, 1882. --Mohr 1901. Lawrence); *P. stenophyllum* (Tuck.) Fink var. *stenophyllum* (--Henssen 1963a. Lawrence)

**PLATISMATIA** Culb. & C. Culb.

P. TUCKERMANII (Oakes) Culb. & C. Culb. (--Culberson & Culberson 1968. Cleburne, Dekalb, Jackson, Lee. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Clay) Syn: *Cetraria tuckermanii* Oakes (--McCullough 1964. Cleburne)

**POLYCHIDIUM** (Ach.) Gray

P. MUSCICOLA (Sw.) Gray (--Fink 1935. Alabama) Syn: *Leptogium muscicola* (Sw.) Fr. (--Mohr 1901. Lee)

**POLYMERIDIUM** (Müll. Arg.) R. C. Harris

P. CATAPASTUM (Nyl.) R. C. Harris (--Harris 1975, 1991. Baldwin)

P. PROPONENS (Nyl.) R. C. Harris (--Harris 1991. Baldwin, Conecuh. --R. C. Harris, pers. comm. Cherokee) Syn: *Campylothelium amylosporum* (Vainio) R. C. Harris (--Tucker & Harris 1980)

P. QUINQUESEPTATUM (Nyl.) R. C. Harris. (--Harris 1975, 1991. Baldwin, Lawrence) Syns: *Arthopyrenia quinqueseptata* (Nyl.) Müll. Arg. (--Fink 1935); *Pyrenula quinqueseptata* (Nyl.) Tuck. (--Tuckerman 1872. --Mohr 1901. "Southern Alabama")

**POLYSPORINA** Vezda

P. SIMPLEX (Davies) Vezda (--R. C. Harris, pers. comm. Clay, Jackson, Marion)

**PORINA** Müll. Arg.

P. CESTRENSIS (Tuck. ex Michener) Müll. Arg. (--Fink 1935. Alabama) Syn: *Sagedia cestrensis* Tuck. (--Tuckerman 1872. --Mohr 1901. Lawrence)

P. HETEROSPORA (Fink) R. C. Harris (--Brodo et al. 2001. --R. C. Harris, pers. comm. Dekalb/Marshall, Winston)

P. NUCULA Ach. (--Fink 1935. Alabama. --UNA, Randolph) Syn: *Segestria nucula* Fr. (--Tuckerman 1872. --Mohr 1901)

**PORPIDIA** Körber

P. ALBOCAERULESCENS (Wulfen) Hertel & Knoph (--Brodo et al. 2001. --R. C. Harris, pers. comm. Cherokee, Clay, Cleburne, Winston) Syn: *Lecidea albocaerulescens* (Wulf.) Ach. (--Tuckerman 1888. --Fink 1935. Alabama. --UNA, Chilton)

P. MACROCARPA (DC.) Hertel & A. J. Schwab (--R. C. Harris, pers. comm. Dekalb/Marshall) Syn: *Lecidea contigua* Fr. (--Mohr 1901. Winston)

P. TAHAWASIANA Gowan (--R. C. Harris, pers. comm. Clay, Dekalb, Franklin, Jackson, Marion, Winston)

**PROTOBLASTENIA** (Zahlbr.) J. Steiner

P. RUPESTRIS (Scop.) J. Steiner Syn: *Placodium rupestre* (Scop.) Branth & Rostr. (--Tuckerman 1882)

**PSEUDEVERNIA** Zopf

P. CONSOCIANS (Vainio) Hale & Culb. (--Hale 1979)

**PSEUDOCYPHELLARIA** Vainio

P. AURATA (Ach.) Vainio (--McCullough 1964, 1967. Calhoun, Chilton, Cleburne, Jefferson, Shelby, Talladega. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Cherokee, Cleburne) Syn: *Sticta aurata* Ach. (--Tuckerman 1882. "Gulf States" --Mohr 1901. Mobile) {Alabama reports of P. CROCATA (L.) Vainio (--McCullough 1964. Cleburne) and *Sticta crocata* (L.) Ach. by (--Mohr 1901. Lee. --Fink 1935. Alabama) most likely belong here}

**PSEUDOPARMELIA** Lynge

P. CUBENSIS (Nyl.) Elix & Nash (--Elix & Nash 1997. Baldwin, Mobile)

P. ULEANA (Müll. Arg.) Elix & Nash (--Elix & Nash 1997. Baldwin, Mobile. --Brodo et al. 2001) {N. Amer. reports of *P. sphaerospora* (C. M. Wetmore, pers. comm.) belong here}

**PSORA** Hoffm.

P. DECIPIENS (Hedwig) Hoffm. (--Hale 1979. --Brodo et al. 2001)

P. RUSSELLII (Tuck.) A. Schneider (--Hale 1979. --Schneider 1979) Syns: *Biatora russellii* Tuck. (--Tuckerman 1872, 1888. "Southern country". --Mohr 1901. Lawrence, Lee); *Lecidea russellii* Tuck. (--Tuckerman 1862)

**PSOROTICHIA** A. Massal.

P. SCHAERERI (A. Massal.) Arnold (--Fink 1935. Alabama) Syn: *Pyrenopsis schaereri* A. Massal. (--Tuckerman 1882. --Mohr 1901. Lawrence)

**PSORULA** Gotth. Schneider

P. RUFONIGRA (Tuck.) Gotth. Schneider (--Brodo et al. 2001) Syn: *Biatora rufonigra* Tuck. (--Mohr 1901. Lawrence)

**PUNCTELIA** Krog

P. APPALACHENSIS (Culb.) Krog Syn: *Parmelia appalachensis* Culb. (--Hale 1979)

P. BOLLIANA (Müll. Arg.) Krog (--Hale 1979. --C. M. Wetmore, pers. comm. Baldwin)

[? *P. borreri* (Sm.) Krog Syn: *Parmelia borreri* (Sm.) Turner (--Mohr 1901. Lee)]

P. PUNCTILLA (Hale) Krog Syn: *P. missouriensis* G. Wilh. & Ladd (--R. C. Harris, pers. comm. Dekalb/Marshall Cos.)

P. RUDECTA (Ach.) Krog (--Brodo et al. 2001. --R. C. Harris, pers. comm. Bibb, Cherokee, Clay) Syn: *Parmelia rudecta* Ach. (--McCullough 1962, 1964, 1967. Bibb, Calhoun, Chambers, Cherokee, Chilton, Clay, Cleburne, Coosa, Etowah, Jefferson, Lee, Randolph, St. Clair, Shelby, Talladega, Tallapoosa. --Embry 1977. Bullock, Dallas, Greene, Hale, Lowndes, Macon, Marengo, Montgomery, Perry, Pickens, Russell, Sumter. --Hale 1979. --UNA, Escambia, Geneva, Lawrence, Marshall, Tuscaloosa. --TROY, Crenshaw, Pike)

P. SUBRUDECTA (Nyl.) Krog Syns: *Parmelia dubia* (Wulfen) Schaerer (--Culberson & Culberson 1956); *Parmelia subrudecta* Nyl. (--Hale 1979. --TROY, Crenshaw, Pike) {North American reports of P. SUBRUDECTA may =P. PERRETICULATA (Räsänen) G. Wilh. & Ladd, see Aptroot 2003}

**PYCNOTHELIA** Dufour

P. PAPILLARIA Dufour (--Brodo et al. 2001. --R. C. Harris, pers. comm. Marion) Syn: *Cladonia papillaria* (Ehrh.) Hoffm. (--Thomson 1967a. --Embry 1977. Macon)

**PYRENULA** A. Massal.

P. ANOMALA (Ach.) Vainio (--Harris 1989. Baldwin, Escambia, Houston, Mobile) {North American reports of *P. aggregata* Fèe (--Tuckerman 1872. --Mohr 1901. Conecuh) belong here}

P. ASTROIDEA (Fée) R. C. Harris Syns: *Pyrenastrum astroidea* (Fée) Eschw. (--Tuckerman 1872. --Mohr 1901)

P. CARYAE R. C. Harris (--Harris 1995. Cleburne, Tuscaloosa)

P. CITRIFORMIS R. C. Harris (--Harris 1989. Clarke, Cleburne, Lee)

P. CONCATERVANS (Nyl.) R. C. Harris (--Harris 1989. Clarke, Mobile)

P. CONFOEDERATA R. C. Harris (--Harris 1989. Baldwin)

P. CRUENTA (Mont.) Vainio (--Harris 1989. Baldwin, Clarke, Conecuh, Covington, Escambia, Houston, Lee, Mobile. --Brodo et al. 2001) Syn: *Trypethelium cruentum* Mont. (--Tuckerman 1872. --Mohr 1901. Mobile)

P. CUYABENSIS (Malme) R. C. Harris Syn: *Parathelium cuyabense* Malme (--Tucker & Harris 1980)

[? *P. laevigata* (Pers.) Arnold Syn: *P. glabrata* (Ach.) A. Massal. (--Mohr 1901. Lee, Mobile)]

P. LEUCOSTOMA Ach. (--Harris 1989. Baldwin, Clarke, Clay, Cleburne, Covington, Houston, Lee, Marengo, Monroe, Pickens, Pike, St. Clair, Tuscaloosa. --R. C. Harris, pers. comm. Dekalb/Marshall, Winston)

P. MAMILLANA (Ach.) Trev. (--Tuckerman 1888. "Southern States") Syn: *P. marginata* Hook. (--Harris 1989. Baldwin, Clarke, Escambia, Houston, Mobile)

P. MICROCARPA Müll. Arg. Syn: *P. texana* Tuck. ex R. C. Harris (--Tucker & Harris 1980)

P. MICROTHECA R. C. Harris (--Harris 1989. Baldwin)

[*P. nitida* (Weigel) Ach. (--Mohr 1901. Lawrence, Lee, Mobile), misidentifications for N. Amer., Esslinger 2002]

[*P. nitida* (Weig.) Ach. var. *nitidella* Flörke. (--Tuckerman 1872. --Mohr 1901. Conecuh) =PYRENULA NITIDELLA (Flörke ex Schaerer) Müll. Arg., but misidentifications for North America]

P. PSEUDOBUFONIA (Rehm) R. C. Harris (--Brodo et al. 2001. --R. C. Harris, pers. comm. Cleburne)

P. PUNCTELLA (Nyl.) Trev. (--Harris 1989. Baldwin, Cleburne, Lawrence, Monroe, Tuscaloosa. --R. C. Harris, pers. comm. Cleburne, Winston)

P. PYRENULOIDES (Mont.) R. C. Harris (--Harris 1989. Baldwin, Monroe) Syn: *P. pachycheila* Tuck. (--Tuckerman 1872, 1888. --Mohr 1901)

P. RAVENELII (Tuck.) R. C. Harris Syn: *Pyrenastrum ravenelii* Tuck. (--Tuckerman 1888. "Southern States")

P. SANTENSIS (Nyl.) Müll. Arg. (--Harris 1989. Clarke, Escambia, Houston, Lee, Monroe. --R. C. Harris, pers. comm. Cherokee, Winston. --UNA, Conecuh) Syn: *P. mamillana* (Ach.) Trev. var. *santensis* (Tuck.) Nyl.

(--Tuckerman 1872. --Mohr 1901. Conecuh)

P. SEPTICOLLARIS (Eschw.) R. C. Harris (--Harris 1989. Escambia)

[*P. thelaena* (Ach.) Tuck. (--Tuckerman 1872. --Mohr 1901. Lawrence, Lee) =*Mycomicrothelia thelena* (Ach.) D. Hawksw.; but not found in North America, Esslinger 2002]

P. THELOMORPHA Tuck. (--Tuckerman 1872. --Harris 1989. Clarke, Monroe)

**PYRRHOSPORA** Körber

P. RUSSULA (Ach.) Hafellner (--Brodo et al. 2001. --R. C. Harris, pers. comm. Marion) Syns: *Biatora russula* (Ach.) Mont. (--Tuckerman 1888. --Mohr 1901. Mobile); *Lecidea russula* Ach. (--UNA, Barbour, Conecuh, Covington, Houston)

P. VARIANS (Ach.) R. C. Harris (--R. C. Harris, pers. comm. Cleburne, Marion) Syns: *Biatora varians* (Ach.) Tuck. (--Tuckerman 1888. --Mohr 1901. Mobile); *Lecidea varians* Ach. (--UNA, Walker)

**PYXINE** Fr.

P. ALBOVIRENS (G. Meyer) Aptroot (--R. C. Harris, pers. comm. Baldwin)

P. CAESIOPRUINOSA (Tuck.) Imshaug (--Imshaug 1957. Mobile. --Culberson & Hale 1965. --McCullough 1967. Bibb, Jefferson. --Dey 1977. --Embry 1977. Marengo, Perry, Russell. --Hale 1979. --Amtoft 2002. --UNA, Tuscaloosa)

P. ESCHWEILERI (Tuck.) Vainio (--Imshaug 1957. Mobile. --Embry 1977. Hale. --Hale 1979. --Brodo et al. 2001)

P. SOREDIATA Fr. (--Mohr 1901. Lawrence, Mobile. --Imshaug 1957. --McCullough 1962, 1964, 1967. Bibb, Calhoun, Chambers, Cherokee, Chilton, Clay, Cleburne, Coosa, Jefferson, Lee, Randolph, St. Clair, Shelby, Talladega, Tallapoosa. --Embry 1977. Hale, Perry, Russell. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Clay, Dekalb/Marshall) Syn: *Pyxine cocoes* (Sw.) Nyl var. *sorediata* (--Tuckerman 1860)

P. SUBCINEREA Stirton (--Amtoft 2002. --R. C. Harris, pers. comm. Baldwin, Bibb, Cherokee, Lee)

**RAMALINA** Ach.

R. AMERICANA Hale (--Hale 1979. --Culberson et al. 1990. Baldwin. --LaGreca 1999. --Brodo et al. 2001. --UNA, Chilton. --AUA, Bullock, Butler, Coffee, Conecuh, Crenshaw, Dale, Geneva, Montgomery, Pike, Russell. --TROY, Barbour, Bibb, Covington, Henry, Macon)

[? *R. calicaris* (L.) Fr. (--Mohr 1901. Mobile) Syn: *R. calicaris* (L.) Fr. var. *canaliculata* Fr. (--Mohr 1901. Mobile)]

R. CELASTRI (Spreng.) Krog & Swinscow Syns: *R. laevigata* Fr. (--Mohr 1901. Mobile); *R. yemensis* (Ach.) Nyl. (--Fink 1935. Alabama)

R. COMPLANATA (Sw.) Ach. (--Embry 1977. Bullock, Macon, Montgomery, Pickens. --Hale 1979. --Brodo et al. 2001)

R. CULBERSONIORUM La Greca (--LaGreca 1999. --Brodo et al. 2001)

R. FASTIGIATA (Pers.) Ach. (--Howe 1914. --McCullough 1964, 1967. Bibb, Calhoun, Chambers, Chilton, Clay, Coosa, Jefferson, Lee, St. Clair, Shelby, Talladega, Tallapoosa. --Embry 1977. Bullock, Dallas, Greene, Hale, Lowndes, Macon, Marengo, Montgomery, Perry, Pickens, Russell, Sumter) {Earlier reports of this species from North America may refer to RAMALINA AMERICANA, Esslinger 2002}

R. INTERMEDIA (Delise ex Nyl.) Nyl. (--McCullough 1964. Cleburne. --Hale 1979. --R. C. Harris, pers. comm. Clay)

R. MONTAGNEI De Not. (--Brodo et al. 2001)

R. PALUDOSA B. Moore (--Brodo et al. 2001)

R. RIGIDA Pers. ex Ach. (--Mohr 1901. Mobile)

R. STENOSPORA Müll. Arg. (--Embry 1977. Greene, Macon, Montgomery. --Brodo et al. 2001)

R. WILLEYI Howe (--Hale 1979. --Brodo et al. 2001. --AUA, Butler. --TROY, Russell)

**RHIZOCARPON** Ramond ex DC.

[? *R. concentricum* (Davies) Beltr. (--Fink 1935. Alabama) Syn: *R. subconcentricum* Fr. (--Mohr 1901. Lee)]

R. DISPORUM (Nägeli ex Hepp) Müll. Arg. (--Brodo et al. 2001)

R. HOCHSTETTERI (Körber) Vainio (--Brodo et al. 2001. --R. C. Harris, pers. comm. Jackson) Syn: *R. colludens* (Fr.) Nyl. (--Mohr 1901. Lee)

R. PETRAEUM (Wulfen) A. Massal. (--C. M. Wetmore, pers. comm. Lee)

[? *R. postumum* (Nyl.) Arnold (--Fink 1935. Alabama)]

[*R. subpostumum* (Nyl.) Arnold Syn: *Buellia subpostumum* Nyl. (--Mohr 1901. Mobile), a saxicolous European species, misidentifications for North America, Esslinger pers. comm.]

**RHIZOPLACA** Zopf

R. CHRYSOLEUCA (Sm.) Zopf (--Hale 1979) Syn: *Lecanora rubina* (Vill.) Ach. (--Mohr 1901. Winston)

**RIMELIA** Hale & Fletcher

R. CETRATA (Ach.) Hale & Fletcher (--Brodo et al. 2001. --R. C. Harris, pers. comm. Marion) Syns: *Parmelia cetrata* Ach. (--McCullough 1964, 1967. Calhoun, Clay, Coosa, Talladega, Tallapoosa. --Embry 1977. Bullock, Marengo, Montgomery, Pickens, Russell. --UNA, Randolph); *Parmotrema cetratum* (Ach.) Hale (--Hale 1979)

R. RETICULATA (Taylor) Hale & Fletcher (--Brodo et al. 2001. --R. C. Harris, pers. comm. Bibb, Clay, Dekalb/Marshall, Franklin, Jackson, Marion. --AUA, Lee) Syns: *Parmelia reticulata* Taylor (--McCullough 1962, 1964, 1967. Bibb, Calhoun, Chambers, Cherokee, Chilton, Clay, Cleburne, Coosa, Etowah, Jefferson, Lee, Randolph, St. Clair, Shelby, Talladega. --Brodo 1968. --Embry 1977. Bullock, Dallas, Greene, Hale, Lowndes, Macon, Marengo, Perry, Pickens, Russell, Sumter. --UNA, Conecuh, Pike); *Parmotrema reticulatum* (Taylor) M. Choisy (--Hale 1979)

R. SUBISIDIOSA (Müll. Arg.) Hale & Fletcher (--Brodo et al. 2001. --R. C. Harris, pers. comm. Clay, Cleburne, Marion) Syns: *Parmelia subisidiosa* (Müll. Arg.) C. W. Dodge (--McCullough 1964, 1967. Calhoun, Cherokee, Cleburne, Shelby, Talladega. --Embry 1977. Dallas, Greene, Lowndes, Russell, Sumter); *Parmotrema subisidiosum* (Müll. Arg.) Hale (--Hale 1979. --TROY, Montgomery)

**RINODINA** (Ach.) Gray

R. APPLANATA H. Magn. (--UNA, Henry)

R. LEPIDA (Nyl.) Müll. Arg. (--Fink 1935. Alabama) Syn: *R. flavonigella* Tuck. (--Tuckerman 1882. --Mohr 1901. Mobile)

R. TEPHRASPIS (Tuck.) Herre (--R. C. Harris, pers. comm. Clay, Dekalb/Marshall)

**SANTESSONIELLA** Henssen

S. CROSSOPHYLLA (Nyl.) P. M. Jørg. Syns: *Pannaria crossophylla* Tuck. (--Tuckerman 1882. --Mohr 1901. Lawrence); *Parmeliella crossophylla* (Tuck.) G. Merr. & Burnham (--Fink 1935. Alabama)

**SARCOGYNE** Flotow
S. CLAVUS (DC.) Kremp. (--Brodo 1968)
S. PRIVIGNA (Ach.) A. Massal. (--R. C. Harris, pers. comm. Dekalb/Marshall) Syn: *Lecanora privigna* (Ach.) Nyl. (--Tuckerman 1882. --Mohr 1901. Lawrence)
S. REGULARIS Körber (--R. C. Harris, pers. comm. Jackson)
S. SIMILIS H. Magn. (--R. C. Harris, pers. comm. Clay, Jackson, Marion)

**SCOLICIOSPORUM** A. Massal.
S. CHLOROCOCCUM (Stenh.) Vezda (--Brodo et al. 2001. --R. C. Harris, pers. comm. Bibb, Clay)

**SPILONEMA** Bornet
S. PARADOXUM Bornet (--McCullough 1967. St. Clair, Shelby)
S. REVERTENS Nyl. (Brodo et al. 2001)

**STAUROTHELE** Norman
S. DIFFRACTELLA (Nyl.) Tuck. (--Tuckerman 1872. --Thomson 1991. Lawrence. --Brodo et al. 2001. --R. C. Harris, pers. comm. Cherokee, Lauderdale) Syn: *S. petersii* Tuck.
[*S. petersii* Tuck. (--Mohr 1901. Lawrence), *nomen nudum*?]
S. TENUISSIMA Degel. (--Thomson 1991. Lawrence)

**STICTA** (Schreber) Ach.
S. BEAUVOISII Delise (--Brodo et al. 2001. --R. C. Harris, pers. comm. Cleburne, Jackson)
S. CAROLINENSIS McDonald (McDonald et al. 2003. Jackson. --R. C. Harris, pers. comm. Cherokee, Dekalb/Marshall, Winston)
[? *S. fuliginosa* (Hoffm.) Ach. (--Hale 1979. --Brodo et al. 2001)]
[? *S. sylvatica* (Hudson) Ach. (--Mohr 1901. Lee. --Fink 1935. Alabama)]
[*S. weigelii* (Ach.) Vainio (--McCullough 1962, 1964, 1967. Cleburne, Coosa, Jefferson, St. Clair, Shelby, Talladega, Tallapoosa. --Hale 1979); misidentifications for North America, Esslinger 2002]

**STRIGULA** Fr.
S. AMERICANA R. C. Harris (--Harris 1975. Cleburne)
S. COMPLANATA (Fèe) Mont. (--Tuckerman 1872. --Mohr 1901)
S. SMARAGDULA Fr. : Fr. Syn: *Strigula elegans* (Fée) Müll. Arg. (--UNA, Barbour)
S. VIRIDISEDA (Nyl.) R. C. Harris (--Harris 1975. Cleburne)

**SULCOPYRENULA** H. Harada
S. STAUROSPORA (Tuck.) H. Harada (--Harada 1999. Cleburne. --R. C. Harris, pers. comm. Cleburne)

**SYNALISSA** Fr.
S. SYMPHOREA (Ach.) Nyl. (--Tuckerman 1872. --Fink 1935) Syn: *Omphalaria symphorea* (DC.) Tuck. (--Tuckerman 1882. --Mohr 1901. Lawrence)

**TAPELLARIA** Müll. Arg.
T. EPIPHYLLA (Müll. Arg.) R. Sant. Syn: *Lopadium phyllocharis* (Mont.) Fink (--Fink 1935. Alabama)

**TELOSCHISTES** Norman
T. EXILIS (Michx.) Vainio (--Embry 1977. Perry, Sumter. --Hale 1979. --Brodo et al. 2001. --UNA, Conecuh, Henry. --AUA, Crenshaw, Geneva, Montgomery. --TROY, Butler, Coffee, Russell)
T. FLAVICANS (Sw.) Norman Syn: *T. chrysophthalmus* (L.) Beltr. var. *flavicans* Wallr. (--Tuckerman 1882. "Southern States" --Mohr 1901. Mobile)

**TEPHROMELA** M. Choisy

T. ATRA (Hudson) Hafellner (--Brodo et al. 2001) Syn: *Lecanora atra* (Hudson) Ach. (--Tuckerman 1882. --Mohr 1901. Lawrence)

**THELOTREMA** Ach.

T. DEFECTUM Hale (--R. C. Harris, pers. comm. Bibb)

[*T. domingense* (Fèe) Tuck. (--Mohr 1901) =*Ocellularia domingensis* (Fée) Müll. Arg., but misidentifications for North America, Esslinger 2002]

[*T. interpositum* (Nyl.) Müll. Arg. (--Mohr 1901. Mobile. --Fink 1935. Alabama) =*Ocellularia interposita* (Nyl.) Hale, but misidentifications for North America, Esslinger 2002]

T. MONOSPERMUM R. C. Harris (--Harris 1990. Mobile) Syn: *Leptotrema monosporum* (Nyl.) Müll. Arg. (--Fink 1935. Alabama), {for N. Amer. records, see Harris 1990}.

T. SANTENSE Tuck. (--Tuckerman 1862, 1872, 1882. --Mohr 1901. Conecuh) Syn: *Leptotrema santense* (Tuck.) Zahlbr. (--Fink 1935. Alabama)

T. SUBTILE Tuck. (--Tuckerman 1882. --Mohr 1901. Conecuh, Mobile. --R. C. Harris, pers. comm. Cherokee, Winston)

**THYREA** A. Massal.

T. GIRARDII (Dur. & Mont.) Bagl. & Carestia (--Fink 1935. Alabama) Syn: *Omphalaria girardi* Dur. & Mont. (--Tuckerman 1872, 1882. --Mohr 1901. Lawrence)

**TONINIA** A. Massal.

T. TRISTIS (Th. Fr.) Th. Fr. {s. lat.} (--R. C. Harris, pers. comm. Mobile, housed at BUF, prob. undescribed ssp.)

**TRAPELIOPSIS** Hertel & Gotth. Schneider

T. FLEXUOSA (Fr.) Coppins & P. James (--Brodo et al. 2001)

T. GRANULOSA (Hoffm.) Lumbsch (--Brodo et al. 2001)

T. VIRIDESCENS (Schrader) Coppins & P. James Syns: *Biatora viridescens* (Schrad.) Fr. (--Mohr 1901. Mobile); *Lecidea viridescens* (Schrad.) Ach. (--Fink 1935. Alabama)

**TRYPETHELIUM** Spreng.

[*T. mastoideum* (Ach.) Ach. (--Mohr 1901. Mobile. --Fink 1935. Alabama), misidentifications for North America, Harris 1995, records probably =BATHELIUM CAROLINIANUM]

T. TROPICUM (Ach.) Müll. Arg. (--Fink 1935. Alabama. --Brodo et al. 2001. --R. C. Harris, pers. comm. Dekalb/Marshall. --UNA, Conecuh) Syn: *Pyrenula tropica* (Ach.) Trev. (--Tuckerman 1872. --Mohr 1901)

T. VIRENS Tuck. ex Michener (--Tuckerman 1872. --Mohr 1901. Conecuh. --R. C. Harris, pers. comm. Bibb, Marion, Winston) Syns: *T. exocanthum* Tuck. (--Tuckerman 1872, 1888. --Mohr 1901. Conecuh. --Fink 1935. Alabama); *T. scorites* Tuck. (--Mohr 1901. Conecuh, Lee, Mobile. --Fink 1935. Alabama)

**TUCKERMANELLA** Essl.

T. FENDLERI (Nyl.) Essl. Syns: *Cetraria fendleri* Tuck. (--Tuckerman 1882. --Mohr 1901. Mobile, Lawrence. --Fink 1935. Alabama. --TROY, Pike); *Tuckemannopsis fendleri* (Nyl.) Hale (--Brodo et al. 2001. --R. C. Harris, pers. comm. Clay)

**TUCKERMANNOPSIS** Gyel.

T. CILIARIS (Ach.) Gyel. (--R. C. Harris, pers. comm. Clay, Franklin) Syn: *Cetraria ciliaris* Ach. (--McCullough 1964, 1967. Cherokee, Cleburne. --Hale 1979. --UNA, Lawrence)

**UMBILICARIA** Hoffm.

U. MAMMULATA (Ach.) Tuck. (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Clay)

[? *U. vellea* (L.) Hoffm. (--Hale 1979) most probably = a common grayish form of U. MAMMULATA]

**USNEA** Dill. ex Adans.

U. AMBLYOCLADA (Müll. Arg.) Zahlbr. (--Clerc & Herrera-Campos 1997. Talladega. --Brodo et al. 2001)

U. BAILEYI (Stirton) Zahlbr. (--Brodo et al. 2001) Syns: *U. antillarum* (Vainio) Zahlbr. (--Hale 1979. --TROY, Covington, Pike); *U. implicita* (Stirton) Zahlbr. (--Hale 1979)

[*U. barbata* (L.) F. H. Wigg. (--Mohr 1901), misidentifications for North America?, Esslinger 2002]

U. CERATINA Ach. (--Hale 1979)

U. EVANSII Mot. (--Motyka 1936. Baldwin)

[? *U. filipendula* Stirton Syns: *U. barbata* (L.) F. H. Wigg. var. *dasypogon* Fr. (--Mohr 1901. Winston); *U. dasypoga* (Ach.) Nyl. (--McCullough 1964, 1967. Cleburne, Coosa, St. Clair, Shelby, Talladega. --Hale 1979)]

U. MUTABILIS Stirt. (--Motyka 1936. --McCullough 1962, 1964, 1967. Bibb, Cleburne, Jefferson, Talladega. --Embry 1977. Dallas, Marengo. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Bibb, Clay, Cleburne, Marion. --AUA, Butler, Coffee. --TROY, Barbour, Geneva, Macon, Pike)

U. RUBICUNDA Stirton (--McCullough 1964, 1967. Bibb, Cherokee, Clay, Cleburne, Coosa, Etowah, Jefferson, St. Clair, Shelby, Talladega. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Cleburne)

U. STRIGOSA (Ach.) A. Eat. (--Motyka 1936. Baldwin, Lee. --McCullough 1964, 1967. Bibb, Calhoun, Chambers, Cherokee, Chilton, Clay, Cleburne, Coosa, Jefferson, Lee, Randolph, St. Clair, Shelby, Tallapoosa. --Embry 1977. Bullock, Dallas, Greene, Hale, Lowndes, Marengo, Montgomery, Perry, Pickens, Russell, Sumter. --Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Cleburne, Dekalb/Marshall, Winston. --UNA, Barbour, Choctaw, Conecuh, Covington, Dale, Fayette, Geneva, Henry, Pike. --AUA, Butler, Coffee, Crenshaw. --TROY, Macon)

U. STRIGOSA (Ach.) A. Eat. ssp. RUBIGINEA (Michx.) I. Tav. Syns: *U. barbata* (L.) F. H. Wigg. var. *rubiginea* (Michx.) A. Massal. (--Mohr 1901. Mobile); *U. rubiginea* (Michx.) A. Massal. (--UNA, Coosa)

[? *U. subfloridana* Stirton Syn: *U. comosa* (Ach.) Röhl. (--McCullough 1964, 1967. Clay, Coosa, Shelby, Talladega. --C. M. Wetmore, pers. comm. Dekalb)]

U. SUBFUSCA Stirton Syn: *U. subfusca* Stirton var. *halei* Herre. (--McCullough 1967. Shelby)

U. SUBSCABROSA Mot. (--Brodo et al. 2001. --R. C. Harris, pers. comm. Clay, Franklin)

U. TRICHODEA Ach. (--Mohr 1901. Cullman --Motyka 1936. Sumter. --McCullough 1964. Randolph, Tallapoosa. --Hale 1979. --Brodo et al. 2001. --TROY, Pike)

**VERRUCARIA** Schrader

V. BALDENSIS A. Massal., s. lat. (--R. C. Harris, pers. comm. Dekalb/Marshall)

V. CALCISEDA DC. (--R. C. Harris, pers. comm. Blount)

V. CALKINSIANA Servít (--R. C. Harris, pers. comm. Colbert)

V. FUSCELLA (Turner) Winch (--Tuckerman 1872. --Mohr 1901. Lawrence. --Fink 1935)

V. MARMOREA (Scop.) Arnold (--Fink 1935. Alabama) Syn: *V. rupestris* Schrader var. *purpurascens* (Hoffm.) Schaer. (--Mohr 1901)

**VULPICIDA** J.-E. Mattsson & M. J. Lai

V. VIRIDIS (Schwein.) J.-E. Mattsson & M. J. Lai (--Brodo et al. 2001. R. C. Harris, pers. comm. Marion) Syn: *Cetraria juniperina* (L.) Ach. (--McCullough 1964. Clay, Cleburne, Coosa); *Cetraria viridis* Schwein. (--McCullough 1967. Calhoun, Cherokee, Shelby, Talladega. --Embry 1977. Macon, Perry. --Hale 1979. --AUA, Pike. --TROY, Montgomery)

**XANTHOPARMELIA** (Vainio) Hale

X. ANGUSTIPHYLLA (Gyel.) Hale (--Hale 1979) {Reports of *X. hypopsila* (--Hale 1979) are misidentifications for North America and most probably belong here, Esslinger 2002}

X. CHLOROCHROA (Tuck.) Hale (--C. M. Wetmore, pers. comm.)

X. CONSPERSA (Ehrh. ex Ach.) Hale (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Dekalb/Marshall, Franklin, Jackson, Marion) Syns: *Parmelia conspersa* (Ehrh. ex Ach.) Ach. (--Mohr 1901. Lee. --Hale 1964. --McCullough 1967. Calhoun, Etowah, Jefferson, St. Clair, Shelby, Talladega. --AUA, Lee); *Parmelia isidiata* (Anzi) Gyel. (--Hale 1955b. --McCullough 1962, 1964. Cleburne, Jefferson, Lee, Randolph, Tallapoosa)

X. CUMBERLANDIA (Gyel.) Hale (--Hale 1979. --Brodo et al. 2001)

X. ISIDIASCENS Hale (--Hale 1990. Randolph. --R. C. Harris, pers. comm. Jackson, Marion)

X. NEOTARACTICA Hale (--Hale 1990. Montgomery)

X. PLITTII (Gyel.) Hale (--Hale 1979. --Brodo et al. 2001. --AUA, Lee) Syn: *Parmelia plittii* Gyel. (--Hale 1964)

X. SOMLOENSIS (Gyel.) Hale (--Hale 1979. --Brodo et al. 2001. --R. C. Harris, pers. comm. Clay) Syn: *Parmelia stenophylla* (Ach.) Du Rietz (--McCullough 1967. Cherokee, St. Clair), {Alabama reports of *X. taractica* (Kremp.) Hale (--Hale 1979) (known from Mexico) are misidentifications for our area. Western N. American specimens are mostly X. COLORADOENSIS and eastern N. American specimens are mostly X. SOMLOENSIS, Esslinger 2002}

X. SUBRAMIGERA (Gyel.) Hale (--Hale 1979. --R. C. Harris, pers. comm. Clay) Syn: *Parmelia subramigera* Gyel. (--Hale 1964)

X. TASMANICA (Hook. f. & Taylor) Hale (--Hale 1979)

**XANTHORIA** (Fr.) Th. Fr.

X. FULVA (Hoffm.) Poelt & Petutschnig (--Lindblom 1997. Tuscaloosa. --Brodo et al. 2001) {Alabama reports of *Physcia parietina* (L.) Nyl. var. *laciniosa* Duf. (--Tuckerman 1860), *Teloschistes polycarpus* (Hoffm.) Tuck. (--Mohr 1901. Winston), X. CANDELARIA (L.) Th. Fr. (--McCullough 1967. Etowah, Jefferson. --Hale 1979. --AUA Barbour, Crenshaw, Geneva. --TROY, Butler, Covington, Pike, Russell), and X. ELEGANS (Link) Th. Fr. (--Hale 1979) are all most likely misidentifications of X. FULVA}

**ACKNOWLEDGEMENTS** I thank Ted Esslinger and Richard Harris for help resolving taxonomic conundrums. I am grateful to the curators and directors of the listed herbaria who generously provided information regarding Alabama specimens. I express appreciation to Larry St. Clair for his critical review of this manuscript and for introducing me to the world of lichens. I am indebted to Richard Harris for his discussions and helpful reviews which greatly improved this paper.

## LITERATURE CITED

Amtoft, A. 2002. *Pyxine subcinerea* in the Eastern United States. Bryologist 105: 270-272.

Aptroot, A. 2003. A new perspective on the sorediate *Punctelia* (Parmeliaceae) species of North America. Bryologist 106: 317-319.

Brako, L. 1991. *Phyllopsora* (Bacidiaceae). Flora Neotropica 55: 1-66.

Brodo, I. M. 1968. The lichens of Long Island, New York: a vegetational and floristic analysis. New York State Mus. & Sci. Serv. Bull. 410: 1-330.

Brodo, I. M. 1984. The North American species of the *Lecanora subfusca* group. Beih. Nova Hedwigia 79: 63-185.

Brodo, I. M. 1991. Studies in the lichen genus *Ochrolechia*. 2. Corticolous species of North America. Canad. J. Bot. 69: 733-772

Brodo, I. M., S. D. Sharnoff, & S. Sharnoff. 2001. *Lichens of North America*. New Haven, Connecticut. Yale Univ. Press.

Buck, W. R. 1998. Lichen flora of eastern North America: the genus *Gomphillus* (Gomphillaceae), pp. 71-76, In Lichenographia Thomsoniana: North American Lichenology in Honor of John W. Thomson, Mycotaxon Ltd., Ithaca, NY.

Carter, E. A. & V. G. Seaquist. 1984. Extreme weather history and climate atlas for Alabama. Huntsville, Alabama. The Strode Publishers.

Chen, J. B., S. L. Wang, & J. A. Elix. 2003. Parmeliaceae (ascomycota) lichens in China's mainland. I. The genera *Canomaculina*, *Parmelina*, *Parmelinella* and *Parmelinopsis*. Mycotaxon 86: 19-29.

Clerc, P. & M. A. Herrera-Campos. 1997. Saxicolous species of *Usnea* subgenus *Usnea* (lichenized ascomycetes) in North America. Bryologist 100: 281-301.

Culberson, C. F., W. L. Culberson & A. Johnson. 1990. The *Ramalina americana* complex (Ascomycotina, Ramalinaceae): chemical and geographic correlations. Bryologist 93: 167-186.

Culberson, W. L. 1957. *Parmelia caroliniana* Nyl, and its distribution. J. Elisha Mitchell Sci. Soc. 73: 443-446.

Culberson, W. L. 1961. The *Parmelia quercina* group in North America. Amer. J. Bot. 48: 168-174.

Culberson, W. L. 1964. The range of *Herpothallon sanguineum* in the United States. Bryologist 67: 224-226.

Culberson, W. L. 1969. The chemistry and systematics of some species of the *Cladonia cariosa* group in North America. Bryologist 72: 377-386.

Culberson, W. L. & C. F. Culberson 1956. The systematics of the *Parmelia dubia* group in North America. Amer. J. Bot. 43: 678-687.

Culberson, W. L. & C. F. Culberson. 1968. The lichen genera *Cetrelia* and *Platismatia*. Contr. U.S. Natl. Herb. 34: 449-558.

Culberson, W. L. & M. E. Hale, Jr. 1965. *Pyxine caesiopruinosa* in the United States. Bryologist 68: 113-116.

Culberson, W. L. & M. E. Hale, Jr. 1966. The range of *Normandina pulchella* in North America. Bryologist 69: 365-367.

Degelius, G. 1974. The lichen genus *Collema* with special reference to the extra-European species. Symb. Bot. Upsal. 20(2): 1-215.

Dey, J. P. 1977. Phytogeographic relationships of the fruticose and foliose lichens of the southern Appalachian Mountains. Pp 398-416 in B.C. Parker and M.K. Roane (eds.). The Distributional History of the Biota of the Southern Appalachians. Part IV. Algae and Fungi. Virginiana Poly. Inst. & State Univ., Res. Div. Monogr.

Dibben, M. J. 1980. The chemosystematics of the lichen genus *Pertusaria* in North America north of Mexico. Milwaukee, Wisconsin. Milwaukee Public Mus. Publ. Bot. & Geol. 5.

Elix, J. A. & T. H. Nash, III. 1997. A monograph of the lichen genus *Pseudoparmelia* (Ascomycotina, Parmeliaceae). Bryologist 100: 482-498.

Ekman, S. 1996. The corticolous and lignicolous species of *Bacidia* and *Bacidina* in North America. Opera Bot. 127: 1-148.

Embry, M. E. 1977. A taxonomic study of the macrolichens of the black belt of Alabama. M.S. thesis, Samford University, Birmingham, Alabama.

Erichsen, C. F. E. 1941. Neue Pertusarien aus den Vereinigten Staaten von Nordamerika. Ann. Mycol. 39: 387-395.

Esslinger, T. L. 2002. A cumulative checklist for the lichen-forming, lichenicolous and allied fungi of the continental United States and Canada. North Dakota State University. Online at: http://www.ndsu.nodak.edu/instruct/esslinge/chcklst/chcklst7.htm, Fargo, North Dakota.

Evans, A. W. 1944. On *Cladonia polycarpia* Merrill. Bryologist 47: 49-56.

Evans, A. W. 1947. A study of certain North American Cladoniae. Bryologist 50: 14-51.

Evans, C. M. 1999. The complete guide to Alabama weather. Birmingham, Alabama. Seacoast Publishing.

Fink, B. 1904. Further notes on Cladonias. IV. *Cladonia verticillata*. Bryologist 7: 85-88.

Fink, B. 1907. Further notes on Cladonias. XII. *Cladonia bacillaris, Cladonia macilenta* and *Cladonia didyma*. Bryologist 10: 77-79.

Fink, B. 1935. *The lichen flora of the United States*. Ann Arbor, Michigan. Univ. of Michigan Press.

Goffinet, B. & J. Miadlikowska. 1999. *Peltigera phyllidiosa* (Peltigeraceae, Ascomycotina), a new species from the southern Appalachians corroborated by ITS sequences. Lichenologist 31: 247-256.

Grube, M. & M. Giralt. 1996. Studies on some species of *Arthothelium* occurring in the western Mediterranean. Lichenologist 28: 15-36.

Hafellner, J. 1997. A world monograph of *Brigantiaea* (lichenized Ascomycotina, Lecanorales). Symb. Bot. Upsal. 32: 35-74.

Hale, M. E., Jr. 1955a. Studies on the chemistry and distribution of North American lichens. (1-5). Bryologist 58: 242-246.

Hale, M. E., Jr. 1955b. *Xanthoparmelia* in North America I. The *Parmelia conspersa-stenophylla* group. Bull. Torrey Bot. Club 82: 9-21.

Hale, M. E., Jr. 1956. Studies on the chemistry and distribution of North American lichens. (6-9). Bryologist 59: 114-117.

Hale, M. E., Jr. 1957. The identity of *Parmelia hypotropoides*. Bryologist 60: 344-347.

Hale, M. E., Jr. 1958. The occurrence of *Parmelia formosana* in North America. Castanea 23: 89-90.

Hale, M. E., Jr. 1959a. New or interesting species of *Parmelia* in North America. Bryologist 62: 16-24.

Hale, M. E., Jr. 1959b. New or interesting Parmelias from North and Tropical America. Bryologist 62: 123-132.

Hale, M. E., Jr. 1964. The *Parmelia conspersa* group in North America and Europe. The Bryologist 67:462-473.

Hale, M. E., Jr. 1965. A monograph of *Parmelia* subgenus *Amphigymnia*. Contr. U.S. Natl. Herb. Vol. 36, Part 5.

Hale, M. E., Jr. 1967. New taxa in *Cetraria*, *Parmelia*, and *Parmeliopsis*. Bryologist 70: 414-422.

Hale, M. E., Jr. 1971. *Parmelia permaculata*, a new lichen from Alabama and Mexico. Phytologia 21: 425.

Hale, M. E., Jr. 1972. *Parmelia pustulifera*, a new lichen from Southeastern United States. Brittonia 24: 22-27.

Hale, M. E., Jr. 1975. A revision of the lichen genus *Hypotrachyna* (Parmeliaceae). Smithsonian Contr. Bot. 25: 1- 73.

Hale, M. E., Jr. 1976a. A monograph of the lichen genus *Pseudoparmelia* Lynge (Parmeliaceae). Smithsonian Contr. Bot. 31: 1-62.

Hale, M. E., Jr. 1976b. A monograph of the lichen genus *Bulbothrix* Hale (Parmeliaceae). Smithsonian Contr. Bot. 32: 1-29.

Hale, M. E., Jr. 1976c. A monograph of the lichen genus *Parmelina* Hale (Parmeliaceae). Smithsonian Contr. Bot. 33: 1-60

Hale, M. E., Jr. 1979. *How to know the lichens*, 2nd ed. Dubuque, Iowa: W.C. Brown.

Hale, M. E., Jr. 1987. A monograph of the lichen genus *Parmelia* Acharius sensu stricto (Ascomycotina: Parmeliaceae). Smithsonian Contr. Bot. 66: 1-55.

Hale, M. E., Jr. 1990. A synopsis of the lichen genus *Xanthoparmelia* (Vainio) Hale (Ascomycotina, Parmeliaceae). Smithsonian Contr. Bot. 74: 1-250

Hale, M. E., Jr. & S. Kurokawa. 1964. Studies on *Parmelia* subgenus *Parmelia*. Contr. U.S. Natl. Herb. 36: 121- 191.

Hale, M. E., Jr. & H. A. McCullough. 1968. *Parmelia alabamensis*, a new species of lichen from Alabama. Bryologist 71: 44-45.

Hansen, C. J. 2003. The John D. Freeman Herbarium (AUA): a history and catalogue of vascular plant type specimens. Sida 20: 1275-1285.

Harada, H. 1999. *Sulcopyrenula*, a new pyrenocarpous lichen genus (Pyrenulaceae, lichenized Ascomycota). Lichenologist 31: 567-573.

Harris, R. C. 1975. A taxonomic revision of the genus *Arthopyrenia* Massal. s. lat. (Ascomycetes in North America). Ph.D. Dissertation. Michigan State Univ.

Harris, R. C. 1984. *Megalospora porphyritis* in eastern North America. Evansia 1: 24.

Harris, R. C. 1988. *Buellia* in north and central Florida. Evansia 5: 37-45.

Harris, R. C. 1989. A sketch of the family Pyrenulaceae (Melanommatales) in Eastern North America. Mem. New York Bot. Gard. 49: 74-107.

Harris, R. C. 1990. Some Florida lichens. Published by the author, New York Botanical Garden, Bronx, NY. 109pp.

Harris, R. C. 1991. A revision of *Polymeridium* (Muell. Arg.) R.C. Harris (Trypetheliaceae). Bol. Mus. Para. Emílio Goeldi, sér. Bot. 7: 619-644.

Harris, R. C. 1992. *Cladonia petrophila*, a new species from eastern North America. Brittonia 44: 326-330.

Harris, R. C. 1993. *Hypotrachyna costaricensis* new to North America. Evansia 10(3): 98.

Harris, R. C. 1995. More Florida Lichens. Including the 10 Cent Tour of the Pyrenolichens. Published by the author, New York Botanical Garden, Bronx, New York. 192 pp.

Haygood, T. M. 1987. Henry William Ravenel, 1814-1887: South Carolina scientist in the Civil War Era. Tuscaloosa, Alabama. Univ. of Alabama Press.

Hedrick, J. 1933. New genera and species of lichens from the herbarium of Bruce Fink. I. Mycologia 25: 303-316.

Henssen, A. 1963a. The North American species of *Placynthium*. Canad. J. Bot. 41: 1687-1724.

Henssen, A. 1963b. Eine Revision der Flechtenfamilien Lichinaceae und Ephebaceae. Symb. Bot. Upsal. 18: 1-123.

Henssen, A. 1969. Three non-marine species of the genus *Lichina*. Lichenologist 4: 88-98.

Henssen, A. 1970. New or interesting North American lichens. Bryologist 73: 617-623.

Henssen, A. 1989. *Metamelanea* and *Stromatella*, new genera of Lichenaceae. Lichenologist 21: 101-118.

Hinds, P. 1998. Lichen flora of eastern North America: the genus *Parmelia* sensu stricto, pp. 53-69, In Eds: M. G. Glenn, R. C. Harris, R. Dirig & M. S. Cole. Lichenographia Thomsoniana: North American Lichenology in Honor of John W. Thomson, Mycotaxon Ltd., Ithaca, NY.

Howard, G. E. 1970. The lichen genus *Ochrolechia* in North America north of Mexico. Bryologist 73: 93-130.

Howe, R. H. 1914. North American species of the genus *Ramalina*. Part III. Bryologist 17: 1-7.

Imshaug, H. A. 1951. The lichen-forming species of the genus *Buellia* occurring in the United States and Canada. Ph.D. dissertation, University of Michigan. Ann Arbor.

Imshaug, H. A. 1957. The lichen genus *Pyxine* in North and Middle America. Trans. Amer. Microsp. Soc. 76: 246- 269.

Imshaug, H. A. & I. M. Brodo. 1966. Biosystematic studies on *Lecanora pallida* and some related lichens in the Americas. Beih. Nova Hedwigia 12: 1-59.

Johnston, W. D. 1930. Physical divisions of northern Alabama. Geol. Surv. Alabama, Bull. 38.

Jordan, W. P. 1973. The genus *Lobaria* in North America north of Mexico. Bryologist 76: 225-251.

Krog, H. 1974. *Parmelia ultralucens*, a new lichen species in subgenus *Amphigymnia*. Bryologist 77: 253-256.

Kurokawa, S. 1962. A monograph of the genus *Anaptychia*. Beih. Nova Hedwigia 6: 1-115.

Kurokawa, S. 2001. Taxonomic notes on *Parmelia reparata* (Parmeliaceae, Lichenes) and the related species. Bull. Nat. Sci. Mus., Ser. B [Tokyo] 27(1): 1-10.

LaGreca, S. 1999. A phylogenetic evaluation of the *Ramalina americana* chemotype complex (lichenized Ascomycota, Ramalinaceae) based on rDNA ITS sequence data. Bryologist 102: 602-618.

Lamb, I. M. 1963. *Index nominum lichenum*. New York: Ronald Press Company.

Lindblom, L. 1997. The genus *Xanthoria* (Fr.) Th.Fr. in North America. J. Hattori Bot. Lab. 83: 75-172.

Llano, G. A. 1950. A monograph of the lichen family Umbilicariaceae in the Western Hemisphere. Office of Naval Research. Navexos P-831. Department of the Navy. Washington D.C.

Lumbsch, H. T. 1989. Die holarktischen vertreter der flechtengattung *Diploschistes* (Thelotremaceae). J. Hattori Bot. Lab. 66:133-196.

Magnusson, A.H. 1935. On saxicolous species of the genus *Lecidea* proper to North America. Acta Horti Gothob. 10:1-52.

Marbach, B. 2000. Corticole und lignicole Arten der Flechtengattung *Buellia* sensu lato in den Subtropen und Tropen. Biblioth. Lichen. 74:1-384.

McCullough, H. A. 1962. The non-crustose lichens of the Howard College Natural Area. J. Alabama Acad. Sci. 33: 13-16.

McCullough, H. A. 1963. New records for *Anzia ornate* from Alabama. Bryologist 66: 236-237.

McCullough, H. A. 1964. Foliose and fruticose lichens of the Piedmont Upland of Alabama. Bryologist 67: 226- 33.

McCullough, H. A. 1967. Foliose and fruticose lichens of the Valley and Ridge Province of Alabama. Bryologist 70: 351-359.

McDonald, T., J. Miadlikowska, & F. Lutzoni. The lichen genus *Sticta* in the Great Smoky Mountains: a phylogenetic study of morphological, chemical, and molecular data. Bryologist 106: 61-79.

Mohr, C. 1901. *Plant life of Alabama*. Contr. U.S. Natl. Herb., Vol. VI. Washington, D.C. Government Printing Office.

Moore, B. J. 1969. *Lobaria lobulifera*, a new species from Southeastern United States. Bryologist 72: 404-406.

Motyka, J. 1936-38. Lichenum Generis *Usnea* Studium Monographicum. Pars. Systematica. Leopoli.

Nearing, G. G. 1962. The lichen book. Handbook of the lichens of Northeastern United States. Eric Lundberg, Ashton, Maryland.

Nordin, A. 2000. Taxonomy and phylogeny of *Buellia* species with pluriseptate spores (Lecanorales, Ascomycotina). Symb. Bot. Upsal. 33: 1-117.

Peters, T. M. 1886. Sketch of John F. Beaumont. J. Mycology 2: 81-83

Riddle, L. W. 1917. The genus *Parmeliopsis* of Nylander. Bryologist 20: 69-76.

Schneider, G. 1979. Die Flechtengattung *Psora* sensu Zahlbruckner. Biblioth. Lichen. 13: 1-291.

Sheard, J. W. 1992. The lichenized Ascomycete genus *Hafellia* in North America. Bryologist 95: 79-87.

Sipman, H. J. M. 1983. A monograph of the lichen family Megalosporaceae. Biblioth. Lichen. 18: 1-241.

Sorrie, B. A. & A. S. Weakley. 2001. Coastal plain vascular plant endemics: phytogeographic patterns. Castanea 66: 50-82.

Thomson, J. W., Jr. 1950. The species of *Peltigera* of North America north of Mexico. Amer. Midl. Naturalist 44: 1- 68.

Thomson, J. W., Jr. 1963. The lichen genus *Physcia* in North America. Beih. Nova Hedwigia 7: 1-172.

Thomson, J. W., Jr. 1967a. The lichen genus *Cladonia* in North America. Univ. of Toronto Press, Toronto, Canada. 172 pp.

Thomson, J. W., Jr. 1967b. The lichen genus *Baeomyces* in North America north of Mexico. Bryologist 70: 285-298.

Thomson, J. W., Jr. 1987. The lichen genera *Catapyrenium* and *Placidiopsis* in North America. Bryologist 90: 27- 39.

Thomson, J. W., Jr. 1991. The lichen genus *Staurothele* in North America. Bryologist 94: 351-367.

Tucker, S. C. & R. C. Harris. 1980. New and noteworthy pyrenocarpous lichens from Louisiana and Florida. Bryologist 83: 1-20.

Tuckerman, E. 1858. Supplement to an enumeration of North American lichens; part first, containing brief diagnoses of new species. Amer. J. Sci. Arts, ser. 2, 25: 422-430.

Tuckerman, E. 1859. Supplement to an enumeration of North American lichens, continued. Amer. J. Sci. Arts, ser. 2, 28: 200-206

Tuckerman, E. 1860. Observations on North American and some other lichens. Proc. Amer. Acad. Arts 4: 383-407.

Tuckerman, E. 1862. Observations on North American and other lichens. Proc. Amer. Acad. Arts 5: 383-422.

Tuckerman, E. 1864. Observationes lichenologicae. Observations on North American and other lichens. Proc. Amer. Acad. Arts 6: 263-287.

Tuckerman, E. 1872. *Genera lichenum: an arrangement of the North American lichens.* Amherst: Edwin Nelson. 281 pp.

Tuckerman, E. 1877. Observationes lichenologicae, No. 4. Observations on North American and other lichens. Proc. Amer. Acad. Arts 12: 166-185.

Tuckerman, E. 1882. A synopsis of North American lichens: Part I, Comprising the Parmeliacei, Cladoniei, and Coenogoniei. S.E. Casino, Boston.

Tuckerman, E. 1888. A synopsis of the North American lichens: Part II, Comprising the Lecideacei, (in part) and the Graphidacei. New Bedford.

Wetmore, C. M. 1970. The lichen family Heppiaceae in North America. Ann. Missouri Bot. Gard. 57: 158-209.

Wetmore, C. M. 1994. The lichen genus *Caloplaca* in North and Central America with brown or black apothecia. Mycologia 86: 813-838.

Wetmore, C. M. & E. I. Kärnefelt. 1999. What is *Caloplaca cinnabarina*? Bryologist 102: 683-691.

Wyatt, R. & A. Stoneburner. 1982. Range extensions for some cryptogams from granite outcrops in Alabama, USA. Bryologist. 85: 405-409.

# The Taxonomic Status of *Fissidens clebschii*

## Ronald A. Pursell

*Fissidens clebschii* (Fig. 1 a, b) has not been recovered in nature since it was originally collected by Alfred Clebsch in Montomery Co., Tennessee on December 8, 1946 (Type. Lacy Rudolph Bluff on Red River, below mouth of Shelton's Branch, 2 miles east of Clarksville, on clay along path in woods, *713*, MICH). Steere (1950), because of the absence of gametangia and sporophytes, thought that the species belonged to either section *Crenularia* Müll.Hal. or section *Semilimbidium* Müll.Hal., according to the understanding of these sections at that time (Grout, 1943). The species was next treated by Crum and Anderson (1981) who considered it a freakish expression of *F. osmundioides* Hedw. (section *Serridium* Müll.Hal.)

I am of the opinion that the plants are a freakish expression of *F. taxifolius* Hedw. (section *Serridium*), and that the name is better treated as a synonym of that species. Both species share a number of characters, most notable of which are the conspicuously mammillose cells of the vaginant laminae, smooth rhizoids, and laminal cells of similar size (6--11 _m) and shape. *Fissidens osmundioides*, on the other hand, lacks mammillose cells in the vaginant laminae, has papillose rhizoids, a rare feature in *Fissidens,* and larger laminal cells (10--18 _m). The principal difference between *F. clebschii* and *F. taxifolius* is the length of the costa, which in *F. clebschii* extends little beyond the distal end of the vaginant laminae but in *F. taxifolius* ends in the cuspidate leaf apex. A slight difference is seen in the length of the vaginant laminae. In *F. clebschii* these occupy about 3/4 the length of the leaf while in *F. taxifolius* they extend about 2/3 the leaf length.

**Fissidens taxifolius** Hedw., Sp. Musc. Frond. 155. 1801.
*Fissidens clebschii* Steere, The Bryologist 53: 129. 1950, *syn. nov.*

**Acknowledgment**. Thanks to MICH for the loan of the isotype.

## Literature Cited

Crum, H. A. & L. E. Anderson. 1981. Mosses of Eastern North America. Volume 1. New York.
Grout, A. J. 1943. Bryales. Fissidentaceae. N. Amer. Fl. 15 (3): 167--202.
Steere, W. C. 1950. Notes on *Fissidens*. I. *Fissidens clebschii* sp. nov. The Bryologist 53: 129--131.

Department of Biology, 208 Mueller Laboratory, The Pennsylvania State University, University Park, PA 16802

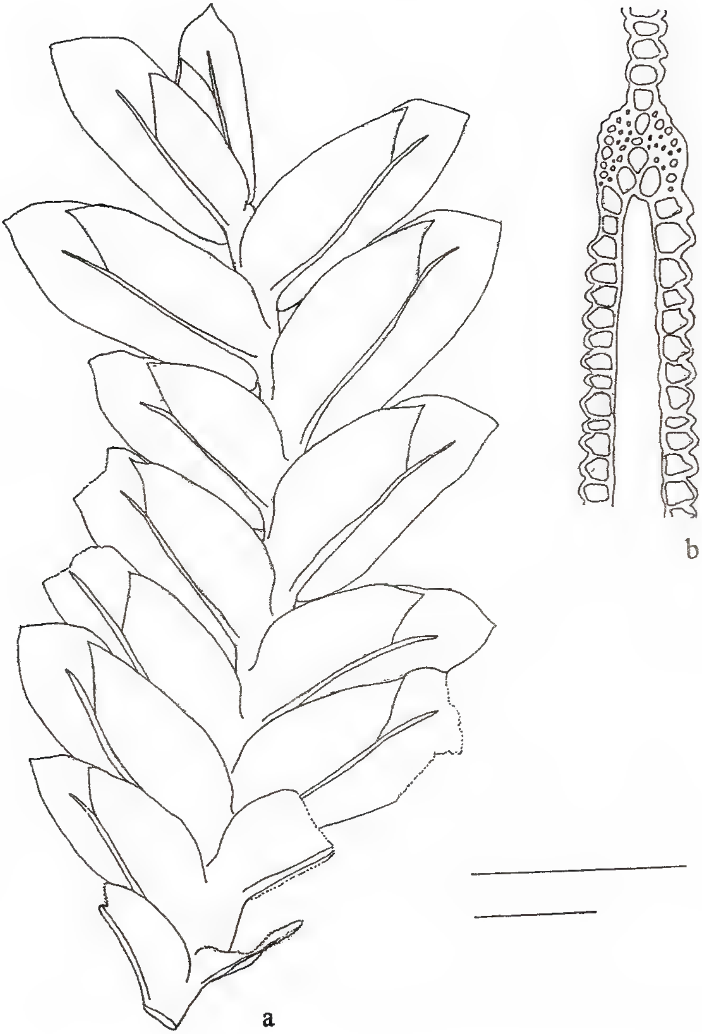


Figure 1. *Fissidens clebschii.* a. Habit. b. Transverse section of leaf through vaginant laminae. Longer bar (a) = 1 mm; shorter bar (b) = 0.05 mm. Drawn from *Clebsch 713*, isotype (MICH).

# *Grimmia bernoullii* Mueller Hal. in the United States

**William A. Weber[1], Ronald C. Wittmann[2], and Richard Worthington[3]**

Fred Hermann collected a *Grimmia* in Hinsdale County, Colorado on July 20, 1976. His collection numbers (vidi, MICH) 27210-27225 included the following species: *Abietinella abietina, Barbilophozia barbata, Bryum sp., Climacium dendroides, Grimmia elatior, Grimmia laevigata, Hypnum revolutum, Mnium arizonicum, Orthotrichum hallii, Pellia sp., Plagiomnium medium, Pohlia cruda, Pseudoleskeella tectorum, Rhytidium rugosum,* and *Tortula (Syntrichia) norvegica.* Hermann subsequently scratched out the epithet *laevigatum* and replaced it by *ovalis*. Duplicates of the collection (No. 27218), according to the notebook, were distributed to DK, COLO, HL, TENN, and MO.

In the course of correspondence with Dr. Henk C. Greven, who has recently published *Grimmias of the World*, we learned that the *Grimmia* belongs to *G. bernoullii* Mueller Hal., which is a Mexican and South American species that would be new to the United States flora.

Greven's paper on the Mexican species of *Grimmia* deals with *G. bernoullii,* a species that hitherto was absent from bryological literature, but he does not attribute *G. ovalis* to the Mexican flora. Nevertheless, he describes the differences between the two species as follows: "[*G. bernoullii*] can easily be confused with other Grimmias, having the habit and growth form of *G. laevigata,* leaves of *G. tergestina*, and sporophytes of *G. ovalis*. However, it differs from *G. laevigata* by basal leaf areolation, hair point, and exserted dark brown capsule with extremely long operculum; from *G. tergestina* by the longly exserted capsules; and from *G. ovalis* by leaf form, leaf posture, basal areolation, ellipsoid capsule with longly rostrate, straight operculum, mitriform calyptra, and coarsely papillose spores."

Before we obtained photocopies of the Hermann field notebook, we made two trips to the Cebolla Creek locality. We searched on boulders and scree slopes, finding only the ubiquitous *Grimmia longirostris.* On our third trip, May 26, 2003, we crossed the creek and explored the talus slope (rhyolite or andesite) on the forested east-facing slope. Following this unsuccessful excursion, we discovered that there are two Cebolla Creek campgrounds, and that Hermann had collected at the second campground, in Hinsdale County, in the "narrows" of Cebolla Creek about 30 miles from the first.

[1] Univ. of Colorado Museum, Boulder
[2] University of Colorado Museum, Boulder
[3] University of Texas at El Paso

Coincidentally, upon our return to Boulder, we received a small package of mosses sent for identification by Richard Worthington, among which was excellent material of *Grimmia bernoullii,* from New Mexico: Lincoln Co.: Sacramento (White ) Mountains, near top of Mon Jeau Peak, T10S, R12E, Sec. 24, NE 1/4m 9,500 ft. alt.; on shaded andesite porphyry boulder below lookout, 20 Aug. 2002. *R. D. Worthington 31576.* The specimens are excellent, with sporophytes still possessing calyptrae and with the requisite papillose spores. Greven has verified this collection.

On July 30, 2003, we found Hermann's actual collecting site and were successful in finding the species: Hinsdale Co.: Gunnison Nat. Forest, Cebolla Creek campground east of Lake City, 2,850 msm, N38°02'50" W107°06'00", *Weber B-113546.* Inasmuch as the species proved so difficult to rediscover, we were especially interested in collecting useful data concerning the habitat.

At Cebolla Creek Campground, the flood-plain of the watercourse, though narrow, has a level area, shaded by *Picea pungens* and various willows. The area contains scattered low partially exposed large water-worn stream boulders that are largely covered by *Grimmia longirostris, Schistidium spp.,* and *Dicranoweisia crispula.* Along the roadside edge, however, we found a large, coffin-shaped rhyolite block, not water-worn, lying just beside and below the road verge. This block measured about four meters long and a meter wide and high. Its vertical faces had a number of horizontal cracks resembling those of bedding planes, and these were filled by tufts of *Grimmia longirostris.*

The almost horizontal surface of the block, however, was pitted with shallow depressions which contained cushions of *G. bernoullii.* These cushions were quite deep and could be easily lifted out with a knife. The stems were erect, black (not green at the apex as they would be in *G. longirostris*, the hair-points stout, the interstices of the tufts were filled with fine soil, so that the individual stems separated readily as they do in *G. laevigata.* The microscopic details have been discussed by Greven (2003) and need not be repeated here.

We believe that the habitat and habit is a precise one, and that the source of the soil in this instance is probably the loosening and movement of the surface soil of the adjacent roadside by traffic and road graders. Any soil that is blown onto the horizontal surface of the block will tend to drift into the depressions during light rains, resulting in the soil-packed moss tufts. The rarity of similar blocks and the proximity of this one to the roadside may explain why the plant is so infrequent at this particular site. Partial shade probably is also important. The adjacent talus slopes are very hot and quite bare of mosses, supporting only crustose lichens. Perhaps this information will aid collectors in discovering new localities.

Greven writes (in litt.) "It is nice to read that you found *G. bernoullii* in a comparable habitat. . . . I found it at three localities, all of them along dusty roads in woodland fringes, so not continuously exposed to the hot sun. . . . In all three places, the plants were growing in rather loose cushions, the interstices filled up with accumulated dust and soil. . . . The stems falling apart is very common in *G. laevigata* and sometimes in *G. ovalis* but not in *G. longirostris*. Deguchi (1987) noted the same aspect when he found the species in Peru.

Although this is a new species for the North American flora, Greven feels that the records are not surprising inasmuch as it is a common species in Mexico, occurring on volcanic rocks as it does in Colorado and New Mexico. We anticipate that, when it is recognized, collections will be forthcoming from additional areas, probably including west Texas and Arizona.

We are grateful for the verification of this material by Dr. Greven, who has reviewed this manuscript, for his patience and guidance, and to Dr. Inigo de la Cerda for providing a photocopy of the relevant pages of Hermann's field notebook. Specimens of the New Mexico collection will be deposited in the herbaria of COLO, MO, MICH, NMCR, NY, and UTEP.

## Literature Cited

Deguchi, H. 1987 [in Inoue, H. Ed.] *Studies in cryptogams in southern Peru*, pp. 19-74. Tokai University Press, Tokyo.

Greven, H. C. 1999. A synopsis of *Grimmia* in Mexico, including *Grimmia mexicana, sp. nov. Bryologist* 103: 426-436.

Greven, H. C. 2003. *Grimmias of the World.* 247 pages + color CD/ROM. Backhuys Publishers, Leiden.

## Guide to contributors to *EVANSIA*

The aim of *Evansia* is to provide a vehicle for the presentation and exchange of useful information on North American bryophytes and lichens. Articles are frequently popular in nature rather than technical and are intended to teach and inform both amateurs and professionals. The articles include, but are not restricted to, announcements of and reports on forays and meetings, presentations of techniques and aids for studying and curating lichens and bryophytes, and reports on local floras. Checklists and papers documenting new regional, state, or county records must include voucher specimens (collector and collection number) and an indication of where the specimens are deposited or a literature reference.

*Evansia* is published with the aid of desktop publishing software and manuscripts can be e-mail attachments (see below) or submitted on computer diskette. The diskette must be IBM compatible (any size) with the author's name, manuscript file name, and word processing software indicated on the disk. Most word processing files can be converted with little effort however an ASCII .txt copy should be sent if you are not using a standard word processor or if the file must be converted from an Apple software.

Manuscripts and correspondence may also be submitted by e-mail to the address listed below. The word processed document should be an attachment to a message. After the manuscript has been successfully received it will be acknowledged by e-mail. Please note that if you are sending ASCII text rather than an attachment an original copy of the manuscript must also be sent to the Editor. At this time images can still be a problem if sent by e-mail. A good quality copy of any illustration should also be mailed.

**IMPORTANT:** Authors should not spend time elaborately formatting their manuscript and should avoid numerous font changes, using footnotes, or other special features. When the manuscript is formatted for *Evansia* most of this work will have to be removed. Note that *Italics*, **bolding** and underlining must be included where appropriate. See recent copies of *Evansia* for style and highlighting of similar manuscripts.

**Manuscripts should be sent to the Editor:**

Robert E. Magill, Missouri Botanical Garden
P.O. Box 299, St. Louis, MO 63166-0299.

e-mail: bob.magill@mobot.org Phone (314) 577-5161. Fax (314) 577-0830

EVANSIA
Bryology Laboratory
Missouri Botanical Garden
P.O. Box 299
Saint Louis, MO 63166-0299 USA

NON-PROFIT ORG.
U.S. POSTAGE
PAID
ST. LOUIS, MO
PERMIT NO. 3566

RICHARD C. HARRIS
NEW YORK BOTANICAL GARDEN
BRONX NY 10458-5126

10

XE
.V3
V.20
#4

# EVANSIA

Volume 20 Number 4

**Bryophytes of Fort Clatsop National Memorial, Oregon**
John A. Christy 107

**Tree Canopy Lichens of the Great Smoky Mountains National Park**
Alex Ciegler (†), Uno H. Eliasson & Harold W. Keller 114

**Correction to Authorship**
**A Catalog and Brief History of the Lichen Flora of Alabama**
**Curtis J. Hansen** - Evansia 20(3): 59-101 (2003) 131

**An Unusual Ammonia-affected Lichen Community on the Oregon Coast**
Bruce McCune 132

**All India Publications** 137

***Trichostomum portoricense* new to the state of Texas**
P. M. Eckel 138

**Mosses from a North Slope Borehole**
Carl E. Darigo 142

**A report from the twenty-seventh annual Andrews Foray September 2002, Saco, Maine**
Lisa St. Hilaire 144

**Clara Cummings Walk nets *Lecanora conizaeoides* for the Boston area**
Elizabeth Kneiper, Elisabeth Lay, Douglas Greene, Scott LaGreca,Francis and Margaret LeBaron 157

**© December, 2003 by the American Bryological and Lichenological Society**

Editor:

Robert E. Magill
Bryology Laboratory
Missouri Botanical Garden
P.O. Box 299
Saint Louis, Missouri 63166-0299
U.S.A.

FAX 314-577-0830

e-mail bob.magill@mobot.org

ISSN 0747-9859

ABLS Web Site:

www.unomaha.edu/~abls

*Evansia* volume 20, number 3 was mailed on 7 September, 2003

# Bryophytes of Fort Clatsop National Memorial, Oregon

**John A. Christy**[1]

**Abstract.** Seventy-two taxa of bryophytes (21 liverworts, 51 mosses, 0 hornworts) are currently known from Fort Clatsop National Memorial. The bryoflora of Fort Clatsop is typical of second-growth low-elevation forests and wetlands along the coast of northern Oregon and southwestern Washington. Soil and duff support the greatest number of taxa, followed in decreasing order by decaying wood, epiphytes, and rock. Restoration of native vegetation and old-growth forest at the Memorial will provide scarce low-elevation habitat with long-term stability for bryophytes.

**Background.** The years 2004-2006 will mark the bicentennial of the Lewis and Clark Expedition, sent by the U.S. government to explore northwestern North America. The 33 members of the expedition traveled 12,800 km by boat, horseback, and foot from the Mississippi River to the mouth of the Columbia River and back again. They spent the winter of 1805-1806 at Fort Clatsop in what is now Fort Clatsop National Memorial (Clatsop County, Oregon; Township 08N, Range 10W, Sections 35 and 36; 46° 123'N, 123° 52'W), about 3.2 km south of the Columbia River and 9.6 km inland from the Pacific Ocean. The park encompasses 51 ha surrounding a replica of the log stockade built by the expedition, and a small site in nearby Seaside where expedition members boiled seawater to obtain salt.

Habitats in the park include second-growth Sitka spruce - western hemlock (*Picea sitchensis - Tsuga heterophylla*) forest, Sitka spruce swamp, Hooker willow - Pacific willow (*Salix hookeriana - Salix lucida* ssp. *lasiandra*) swamp, Hooker willow - crabapple (*Salix hookeriana - Malus fusca*) swamp, red alder (*Alnus rubra*) floodplain forest and red alder swamp, freshwater tidal marsh, permanent and intermittent springs and streams, and weedy habitats around buildings, in lawns, and along trails and abandoned roadbeds. Elevation ranges from 0-18 m above sea level. Total annual precipitation averages 1625 mm, most of which occurs in winter and is followed by summer drought. The average winter temperature in nearby Astoria is 6° C, the average summer temperature 15° C, with extremes ranging from –14 to 38° C.

Of 232 authentic plant specimens known to have been collected by the Lewis and Clark Expedition, two were bryophytes and one was a marine alga (Reveal et al. 1999). One of the bryophytes, the moss *Eurhynchium oreganum*, was collected

---

[1] Oregon Natural Heritage Information Center, Oregon State University, 1322 SE Morrison St., Portland, OR 97210 Email: john.christy@oregonstate.edu

by Meriwether Lewis at Fort Clatsop on 20 January 1806 (Moulton 1999). This specimen, housed at the Academy of Natural Sciences in Philadelphia (PH), is the earliest known scientific collection of a bryophyte to have been made in what is now the state of Oregon, and is also the earliest known collection of this species. Had it fallen into the right hands, Lewis' collection would most certainly have been the type specimen for this species, but unfortunately it was either overlooked or ignored by botanists naming Lewis' specimens of vascular plants. *Eurhynchium* ["*Hypnum*"] *oreganum* was not described until 43 years later by Sullivant (1849), based on a specimen collected in 1841 by William Brackenridge or Charles Pickering of the U.S. Exploring Expedition ["Wilkes Expedition"] from somewhere in western Washington [then also called "Oregon"] between Puget Sound and the Columbia River.

**Recent collecting.** No reports of bryophytes from Fort Clatsop are known other than those referring to Lewis' collection of *Eurhynchium oreganum* in 1806 (Meehan 1898, Coues 1898, Cutright 1969, Reveal et al. 1999, Moulton 1999). After Lewis' departure from Fort Clatsop, no bryophytes were collected from the site for another 180 years, when National Park Service employees, Judith Harpel, and the author began to document the park's bryoflora. Collecting for this report was restricted to the area within the current 125-acre boundary of the park and the adjacent willow swamp owned by the Fort Clatsop Historical Association. Small areas of park ownership east of the Lewis and Clark River and at the Salt Works site in Seaside were not sampled. Voucher specimens were deposited at Fort Clatsop National Memorial and Oregon State University (OSC).

**Current bryoflora and habitat.** Seventy-two taxa of bryophytes are currently known from Fort Clatsop National Memorial, including 21 liverworts and 51 mosses (Table 1). These taxa are represented by at least 123 specimens collected at the site since 1806. Most of the species are very common in the Sitka spruce - western hemlock zone along the coast of northern Oregon and southwestern Washington. No currently-listed rare bryophytes were found, although *Bazzania denudata*, *Polytrichum formosum*, *Sphagnum pacificum*, and *Sphagnum girgensohnii* are uncommon in Oregon.

Soil and duff supported the greatest number of taxa, followed in decreasing order by decaying wood, epiphytes, and rock (Table 2). Epiphytic bryophytes were most abundant on Sitka spruce, western hemlock, bigleaf maple (*Acer macrophyllum*), red alder, salmonberry (*Rubus spectabilis*), and elderberry (*Sambucus racemosa*). Four moss species (*Bryum capillare, Didymodon vinealis* var. *vinealis, Tortula muralis, Zygodon viridissimus* var. *rupestris*) were found only on stones and mortar of a drinking fountain, and are not considered representative of natural habitat in the park. Three species of sphagnum moss (*S. girgensohnii, S. pacificum, S. palustre*) occured in a small Sitka spruce/ skunk cabbage - slough sedge (*Picea sitchensis / Lysichiton americanum - Carex obnupta*) swamp. *Sphagnum* is unknown from other Sitka spruce swamps in Oregon but becomes more common in this habitat in Washington and British Columbia. It may have established relatively recently in the Memorial because it occupies a relatively small portion of suitable habitat present.

Species richness of bryophytes at Fort Clatsop is similar to other low-elevation sites along the coast of Oregon. Hasselbach (1995) reported 91 taxa from Cascade Head Experimental Forest, a site larger than Fort Clatsop and with more diverse forest and rocky habitat, including undisturbed old-growth forest. Christy et al. (1998) estimated that 75 species of bryophytes occur in the Oregon Dunes National Recreation Area, an area many times larger than Fort Clatsop but similarly lacking extensive mature forest or rocky substrates. Saddle Mountain State Park contains at least 92 species of bryophytes but a number of these are restricted to higher elevations not present at Fort Clatsop. Of the three sites, Cascade Head Experimental Forest is most similar to Fort Clatsop in elevation, climate, and history of disturbance. Despite the variety of human disturbances that have occurred at Fort Clatsop since the 1850's, including logging, homesteading, clay mining, and construction of roads, trails, buildings, lawns, and landscaped areas, substrate preferences of bryophytes are very similar to those at Cascade Head (Table 2).

The National Park Service plans to restore native vegetation and old-growth forest at Fort Clatsop to approximate conditions as they were in 1805-1806 when the fort was occupied by Lewis and Clark (National Park Service 1995). Maintenance of existing mid-seral forest stands and their gradual conversion to late seral status will improve the diversity of bryophytes in the park by providing a greater variety of microhabitats, particularly large-diameter decaying logs. An anticipated enlargement of the Memorial from 51 to 607 ha, including additional wetlands and sand dune habitat, will no doubt include new bryophyte habitat and increase the number of taxa presently known from the park. Almost all low-elevation sites along this part of the coast have been disturbed extensively by logging or settlement, and very few tracts in the area owned by federal, state, or local governments are managed as natural areas. This makes Fort Clatsop National Memorial an important site where management will provide long-term habitat stability for bryophytes.

**Acknowledgements.** I am indebted to David Ek, Lynne Johnson, and Nancy Eid of Fort Clatsop National Memorial for funding this project and imparting their collective knowledge of the Memorial and its history. Judith Harpel kindly provided data from her personal herbarium. Lynne Johnson and Nancy Eid provided helpful commentary on the manuscript.

### Literature cited

Christy, J.A., J.S. Kagan & A.M. Wiedemann. 1998. Plant Associations of the Oregon Dunes National Recreation Area, Siuslaw National Forest, Oregon. Technical Paper R6-NR-ECOL-TP-09-98. USDA Forest Service, Pacific Northwest Region, Portland, Oregon. 183 pp.

Coues, E. 1898. Notes on Mr. Thomas Meehan's paper on the plants of Lewis and Clark's expedition across the continent. Proceedings of the Academy of Natural Sciences of Philadelphia 50: 291-315.

Cutright, P.R. 1969. Lewis and Clark: pioneering naturalists. University of Illinois Press, Chicago. 506 pp.

Hasselbach, L. 1995. Nonvascular plant inventory, Cascade Head Experimental Forest and Scenic Research Area. Report to Siuslaw National Forest, Corvallis, Oregon. 7 pp.

Meehan, T. 1898. Plants of Lewis and Clark's expedition across the continent, 1804-1806. Proceedings of the Academy of Natural Sciences of Philadelphia 50: 12-49.

Moulton, G.E. (ed.). 1999. Herbarium of the Lewis and Clark Expedition. Journals of the Lewis and Clark Expedition, Vol. 12. University of Nebraska Press, Lincoln. 357 pp.

National Park Service. 1995. Fort Clatsop National Memorial general management plan, development concept plan, and final environmental impact statement. 376 pp.

Reveal, J.L., G.E. Moulton & A.E. Schuyler. 1999. The Lewis and Clark collections of vascular plants: names, types, and comments. Proceedings of the Academy of Natural Sciences of Philadelphia 149: 1-64.

Sullivant, W.S. 1849. Contributions to the bryology and hepaticology of North America. Memoirs of the Amercan Academy of Arts and Sciences, New Series 4: 169-176.

Table 1. Bryophytes of Fort Clatsop National Memorial, Oregon. Collection numbers are those of the author. Voucher specimens were deposited at Fort Clatsop National Memorial and Oregon State University (OSC). Habitat is Sitka spruce - western hemlock forest unless noted otherwise.

**Liverworts**

*Bazzania denudata* (Torrey) Trevisan: soil and duff (*9087*).
*Calypogeia azurea* R. Stotler & Crotz: rotten decorticated logs. (*9104, 9107*)
*Calypogeia fissa* (Linnaeus) Raddi: soil bank (*9028, 9080*).
*Cephalozia bicuspidata* (Linnaeus) Dumortier: soil, duff, and rotten logs, and in landscaped beds (*9026, 9038, 9106*).
*Cephalozia lunulifolia* (Dumortier) Dumortier: rotten logs (*9105*).
*Cephaloziella turneri* (Hooker) K. Müller: soil bank (*9027*).
*Chiloscyphus pallescens* (Ehrhart) Dumortier: tree roots (*9110*).
*Conocephalum conicum* (Linnaeus) Underwood: seepy soil in red alder / skunk cabbage swamp (*9084*).
*Diplophyllum albicans* (Linnaeus) Dumortier: soil bank (*9029*).
*Frullania nisquallensis* Sullivant: bark of red alder and Pacific willow (*9024, 9045*).
*Gyrothyra underwoodiana* M.A. Howe: soil under red alder and salmonberry (*9088*).
*Lepidozia reptans* (Linnaeus) Dumortier: rotten logs (*9108*).
*Pellia neesiana* (Gottsche) Limpricht: stream banks (*9070*).
*Porella cordaeana* (Huebener) Moore: bark of elderberry in red alder forest (*9081*).
*Porella navicularis* (Lehmann & Lindenberg) Pfeiffer: bark of red alder and Pacific willow (*9046*).
*Radula bolanderi* Gottsche: bark of Sitka spruce in freshwater marsh (*9023*).
*Riccardia latifrons* (Lindberg) Lindberg: root ball of fallen tree in Sitka spruce swamp, and in landscaped bed (*9025, 9036*).
*Riccardia multifida* (Linnaeus) S. F. Gray: old bark chips in landscaped bed (*9037*).
*Riccia fluitans* Linnaeus: root ball of fallen Sitka spruce in freshwater marsh (*9022*).
*Scapania bolanderi* Austin: rotten logs (*9109*).
*Scapania undulata* (Linnaeus) Dumortier: rocks in spring and stream in Sitka spruce swamp (*9042, 9069*).

**Mosses**

*Antitrichia curtipendula* (Hedwig) Bridel: rotten logs and bark of red alder (*9082*).
*Atrichum selwynii* Austin: soil under red alder and salmonberry (*9066*).
*Aulacomnium androgynum* (Hedwig) Schwägrichen: stump in Sitka spruce / Hooker willow - crabapple swamp (*9019*).
*Brachythecium albicans* (Hedwig) Schimper: decaying log on mud flat of tidal river (*9039*).
*Bryum capillare* Hedwig: mortar between basalt blocks of drinking fountain (*9015*).
*Calliergonella cuspidata* (Hedwig) Loeske: rotten log in tidal marsh, and among grass in lawn (*9016, 9064*).
*Ceratodon purpureus* (Hedwig) Bridel: rotten log in tidal marsh (*9017*).
*Claopodium crispifolium* (Hooker) Renauld & Cardot: red alder stump (*9096*).
*Dicranum fuscescens* Turner: bark of western hemlock (*9092*).

*Dicranum scoparium* Hedwig: rotten logs and bases of trees, also in landscaped beds (*9035, 9099*).

*Didymodon vinealis* (Bridel) R.H. Zander: mortar between basalt blocks of drinking fountain (*9015-2*).

*Ditrichum pusillum* (Hedwig) Hampe: soil under red alder and salmonberry (*9065*).

*Epipterygium tozeri* (Greville) Lindberg: root ball of fallen red alder and Pacific willow in Sitka spruce - red alder swamp (*9050, 9078*).

*Eurhynchium oreganum* (Sullivant) A. Jaeger: decaying logs, duff, and stems of elderberry (*9089*).

*Eurhynchium praelongum* (Hedwig) Schimper: stems of salmonberry and on mud in slough sedge swamp (*9071, 9101*).

*Fontinalis howellii* Renauld & Cardot: bark of Pacific willow, and forming submerged beds in seasonally-flooded ponds (*9048, 9093*).

*Heterocladium macounii* Best: over rocks in streambed (*9058*).

*Hookeria lucens* (Hedwig) Smith: mud in slough sedge swamp (*9095*).

*Hygrohypnum ochraceum* (Turner) Loeske: on rock in streambed (*9057*).

*Hylocomium splendens* (Hedwig) Schimper: on duff and soil in skunk cabbage swamp (*9056*).

*Hypnum circinale* Hooker: rotten logs (*9103*).

*Isothecium myosuroides* Bridel: lower trunks and branches of Sitka spruce (*9100*).

*Leucolepis acanthoneuron* (Schwägrichen) Lindberg: on duff and along streambeds (*9090*).

*Neckera douglasii* Hooker: bark of Hooker willow and red alder (*9074, 9074-1*) .

*Oligotrichum aligerum* Mitten: soil at edge of landscaped bed (*9033*).

*Orthotrichum consimile* Mitten: twigs of crabapple and red alder in Sitka spruce / Hooker willow - crabapple swamp (*9021*).

*Orthotrichum lyellii* Hooker & Taylor: bark of red alder and Pacific willow (*9073*).

*Plagiomnium insigne* (Mitten) T.J. Koponen: duff and soil (*9112*).

*Plagiothecium undulatum* (Hedwig) Schimper: duff and rotten logs (*9094*).

*Pogonatum contortum* (Bridel) Lesquereux: duff and rotten logs (*9111*).

*Pohlia cruda* (Hedwig) Lindberg: soil on root ball (*9059*).

*Pohlia proligera* (Kindberg) Lindberg: old bark chips in landscaped bed (*9032*).

*Polytrichastum alpinum* (Hedwig) G.L. Smith: soil in red alder - bigleaf maple - western hemlock forest (*9075*).

*Polytrichum commune* Hedwig: old bark chips in landscaped bed (*9034*).

*Polytrichum formosum* Hedwig: soil (*9062*).

*Polytrichum juniperinum* Hedwig: soil along sidewalk in landscaped area (*9031*).

*Porotrichum bigelovii* (Sullivant) Kindberg: over bedrock in small seasonal waterfall (*9061*).

*Pseudotaxiphyllum elegans* (Bridel) Z. Iwatsuki: rotten wood and soil of root balls and cutbanks (*9040, 9068, 9083, 9097, 9102*).

*Rhizomnium glabrescens* (Kindberg) T.J. Koponen: rotten logs (*9113*).

*Rhytidiadelphus loreus* (Hedwig) Warnstorf: duff (*9091*).

*Rhytidiadelphus squarrosus* (Hedwig) Warnstorf: soil among grass in lawn (*9043, 9063*).

*Rhytidiadelphus triquetrus* (Hedwig) Warnstorf: soil at edge of Sitka spruce - western hemlock - bigleaf maple forest (*9079*).

*Sanionia uncinata* var. *symmetrica* (Renauld & Cardot) H.A. Crum & L.E. Anderson: bark of Hooker willow and crabapple in Sitka spruce / Hooker willow - crabapple swamp (*9018, 9049*).

*Sphagnum girgensohnii* Russow: mucky soil in Sitka spruce / slough sedge - skunk cabbage swamp (*9055, 9060*).

*Sphagnum pacificum* Flatberg: mucky soil in Sitka spruce / slough sedge - skunk cabbage swamp (*9052, 9053*).

*Sphagnum palustre* Linnaeus: mucky soil in Sitka spruce / slough sedge - skunk cabbage swamp (*9054*).

*Tetraphis pellucida* Hedwig: rotten logs and stumps in forest and skunk cabbage swamp (*9044, 9076, 9085*).

*Tortula muralis* Hedwig: mortar between basalt blocks of drinking fountain (*9015-1*).

*Ulota obtusiuscula* J.K.A. Müller & Kindberg: bark of red alder along stream (*9072*).

*Ulota phyllantha* Bridel: twigs of crabapple in Sitka spruce / Hooker willow - crabapple swamp (*9020*).

*Zygodon viridissimus* var. *rupestris* Lindberg: mortar between basalt blocks of drinking fountain (*9015-3*).

Table 2. Substrate preferences for bryophytes at Fort Clatsop National Memorial and Cascade Head Experimental Forest, Oregon (Hasselbach 1995). The total for Fort Clatsop exceeds the 72 taxa known from the site because some occur on more than one substrate. Comparable data for Cascade Head are unavailable.

| Site | Substrate | Liverworts | Mosses | Total |
|---|---|---|---|---|
| | | | | |
| | | | | |
| Fort Clatsop | Soil and duff | 10 | 29 | 39 |
| | Decayed wood | 8 | 14 | 22 |
| | Epiphytic | 5 | 14 | 19 |
| | Rock | 1 | 8 | 9 |
| | total | | | 89 |
| | | | | |
| Cascade Head | Soil and duff | 6 | 30 | 36 |
| | Decayed wood | 12 | 9 | 21 |
| | Epiphytic | 6 | 12 | 18 |
| | Rock | 2 | 14 | 16 |
| | total | | | 91 |

# Tree Canopy Lichens of the Great Smoky Mountains National Park

Alex Ciegler [1] (†), Uno H. Eliasson [2] & Harold W. Keller [3]

**Abstract.** *A study of the tree canopy lichens of the Great Smoky Mountains National Park (GSMNP) based on a total of 2007 samples from 141 trees yielded 194 taxa from the canopy. Eighty-three of these taxa were new records for the GSMNP accessions list and appear to be unpublished records from the Park. The limited area covered, immensity of the Park and its considerable physiographic diversity, all suggest that many more new lichen records remain to be found.* Phaeophyscia hispidula *may represent a disjunct species normally found to the north. Taxa that could not be identified to species are listed with genus designation only.*

The Great Smoky Mountains National Park (GSMNP) comprises more than 210,566 ha and is a refuge for one of the richest and most diverse biota in the temperate regions of the world. It has the largest remaining tracts of old growth forest in the eastern United States, estimated at 40,000 ha, which has resulted in its designation as a National Park, June 15, 1934, an International Biosphere Reserve, October 26, 1976, and a World Heritage Site, December 6, 1983. The Park straddles the boundary between eastern Tennessee and western North Carolina between 35°28'and 35° 47' N latitude. Elevations range from 263 m to 1,994 m. Some of the old growth habitats are quite complex, which can mean higher diversity of certain species. The Smokies are home to five forest types: spruce-fir, northern hardwood, pine-oak, hemlock, and cove hardwood. In addition, the GSMNP is home to over 130 species of trees and over 4,000 plant species. Moderate temperatures, ranging from 4° to 23° C at lower elevations, and an average yearly rainfall ranging from 140 to 216 cm (Shanks 1954), make the Park an exceptional environment for lichens. The "smoke" illusion is attributed to warm air filled with terpene vapors and mist rising in the swirling atmosphere from the lush vegetation, creating a smoke-like haze. The Smokies receive some of the highest amounts of air pollutants in eastern North America (Shanks 1954). The importance of baseline data on the species richness of lichens, especially on living trees, will contribute to a better understanding of the impact of airborne pollutants on tree canopy lichens. To the best of our knowledge no collections of lichens above two meters on living trees have been made in the GSMNP.

[1] 2636 Pine Lake Drive, West Columbia, South Carolina 29169, U.S.A.
[2] Botanical Institute, Göteborg University, Box 461, SE 405 30 Göteborg, Sweden; e-mail: uno.eliasson@botany.gu.se (Corresponding Author)
[3] Department of Biology, Central Missouri State University, Warrensburg, Missouri 64093, U.S.A; e-mail: keller@cmsu1.cmsu.edu

Lichens have been recorded from trees blown down or cut down but a systematic study of lichens from canopy heights has not been undertaken in the park. The purpose of this study was to record and compare the species biodiversity of lichens from the tree canopy and ground sites to determine if certain species were found only in the tree canopy.

A previous study of the lichen flora of the GSMNP was made by Degelius (1941) and a summary of the lichens found on the Tennessee side of the Smoky Mountains are given in Ciegler (1999).

A new research initiative, the All Taxa Biodiversity Inventory (ATBI), under the rubric of a non-profit organization Discover Life in America (web site at www.discoverlife.org) represents a research effort to inventory all life forms in the Park. The initial sampling plan developed by the ATBI established 20 one-hectare study plots located in major habitats throughout the Park. Site selection was based on major forest/vegetation types, elevation, and relative accessibility. No previous study had collected lichens from the tree canopy. The high canopy of the old growth forest allowed collection from many heights, occasionally over 40 m.

There were two aspects in the initial study of the lichen flora of the Great Smoky Mountain National Park (GSMNP), lichen distribution in the canopy of a variety of tree species, and a survey of the lichens in other habitats such as the lower portion of trees, rocks, and soil. In a separate investigation approximately 750 samples from trees and their limbs no higher than 1.8 m above the ground, rocks, soil, and some man-made structures such as wooden fences and rails were also sampled for lichens; 283 taxa were found. This study was conducted primarily in the Cataloochee Valley, Purchase Knob, and to a limited extent, the area around Clingman's Dome. The number of taxa found was larger than that in the canopy study. This can be attributed to the greater variety of substrata sampled even though sample collection was made by only one person during July and August, 2000. These factors also resulted in a smaller area being covered than was desired. The results of this study will be published separately.

The current lichen accessions list of the GSMNP herbarium has 248 species listed. This canopy study added 83 taxa to this list. Many more lichens remain to be identified based on the limited area covered compared to the immensity of the Park and its considerable physiographic dicersity.

## Materials and methods

### *Field methods*

Individual trees were selected from geographically different areas of the Park, but because of access and climbing restraints, random selection was not practical. Acceptable trees exceeded 21 m in height and allowed sampling from the ground continuously to near the top. Tree selection was often limited by climbing hazards such as poison ivy (*Toxicodendron radicans* (L.) Kuntze), dead branches, or overall limb structure. The double rope climbing technique used allowed the climber to advance the rope to higher branches, often reaching near the top of the tree (Counts et al. 2000).

Samples were taken at roughly 3-m increments as the climber advanced upward. Bark was scraped or pried from the trunk using a large knife, taking care not to damage the underlying living tissues of the tree. Efforts were made to sample from all sides of the trunk. All samples were collected from living parts of the tree and placed in paper bags, on which height and tree number were recorded. Each night, bag samples were sorted into bark for myxomycete moist chamber cultures, mosses and liverworts, and lichens. Trunk diameters at breast height (DBH=1.5 m) were measured for each tree, and voucher specimens of leaves were gathered for their positive identification. Each climber used an elevation line marked off in 0.3 m increments to determine tree height measurements. Trees were tagged with numbers, and Global Positioning System (GPS) readings were taken for each climbing site location. In addition, a site description including most recent rain and current weather conditions was recorded (Keller & Skrabal 2002).

The canopy study as pertaining to lichens was somewhat complicated by the following: the difficulty of adequate sampling both qualitative and quantitative; the distracting aspect of collecting four different life forms (lichens, liverworts, mosses, and slime molds), and the necessary division of collected samples to the different investigators involved; sampling was confined primarily to the tree trunk and adjacent large branches thereby missing the smaller branches further removed from the trunk wherein conditions are usually more conducive to lichen growth and development.

### *Identification methods*

Nomenclature generally follows that of Esslinger & Egan (1995). Lichens were identified by the senior author using the standard techniques outlined in Hale (1979), Brodo et al. (2001), and the scientific literature. It should be noted that keys for the lichen genus *Graphis* are quite inadequate so that species identification and nomenclature in the current study may be changed in the future. Two species of *Parmelia, P. saxatilis* (L.) Ach. and *P. squarrosa* Hale, that were found in relatively large numbers are distinguished only by the differences in their rhizine structure. Representative specimens of these two lichens are under study using DNA analyses to determine if these are actually two taxa or are only two different forms of the same species. Some of the taxa are listed only with genus designation since these specimens could not be identified to species. Voucher specimens have been deposited at the herbarium CLEMS, Natural History Museum, Clemson University, Clemson, South Carolina.

## Results and discussion

### *The canopy lichen habitat*

Tree canopy is defined as a vertical transect beginning at 3 m and extending into the crown or tops of living trees. Canopy structure is the organization in space of the above ground components of the vegetation (Parker 1995). This more general definition includes bark surfaces of living trees below the first branches in the crown of individual trees.

It should be noted that trees, with respect to lichen growth, represent a very complex environment encompassing many poorly understood variables. These variables include tree architecture, slope of the land, altitude, air quality, type and amount of moisture available, soil composition, vicinity and height of surrounding trees, tree age, foliage density, bark texture and chemistry including pH, tree height, light availability, and competition from other organisms, especially mosses. There may be additional unknown variables since two trees of the same species growing near each other can harbour different lichens. A poor dispersal ability may strongly affect the distribution of certain species. A species may be found restricted to a single branch of a tree despite neighbouring branches providing an apparently equally suitable substratum.

### *Lichens in the tree canopy*

A total of 2007 samples from 141 trees and one vine were analyzed for lichens; 194 taxa were found. These are summarized in Table 1. This table also gives the total number of specimens found for each taxon. Since a total of 182 trees were sampled during the investigation, the lichen flora from 41 trees were not assessed, thereby possibly skewing final data to an unknown extent. *Phaeophyscia hispidula* (Ach.) Essl., a brown foliose lichen found in the canopy, is primarily a northern species so that its occurrence in the canopy may represent a disjunct. However, physiographic conditions in the GSMNP are probably hemiboreal resulting in the support of normally northern flora. Additionally, lichen surveys in the United States have been relatively limited so that claims to species representing disjuncts may be premature.

### *Lichens on different species of trees*

Including unidentified trees, approximately 45 taxa plus one vine were examined for their support of lichen development. *Acer rubrum* supported a greater lichen diversity (64 species) than other trees although most of the tree species in the study provided good substrata for lichen development. This is not too surprising in that it may reflect on the excellent physiographic conditions pertaining in the GSMNP for lichen growth. However, the following tree species supported rather minimal diversity: *Acer saccharinum* (8 spp.), *Carya pallida* (6 spp.), *Carya tomentosa* (7 spp.), *Quercus falcata* (5 spp.), *Quercus muehlenbergii* (4 spp.), *Quercus velutina* (8 spp.), and *Robinia pseudoacacia* (6 spp.). The vine *Vitis aestivalis* supported seven species. It is possible that these low numbers may reflect inadequate sampling rather than any unfavourable substratum for lichen growth. It would be desirable to conduct additional sampling of these latter species before conclusions can be drawn.

Each tree species has been assigned a reference number. These numbers are indicated in Table 1 in brackets. (Although *Vitis* is a vine rather than a tree, it has been included as an interesting member of the canopy.) The tree species in alphabetical order and their reference numbers are listed as follows:

(1) *Acer pensylvanicum* L., (2) *Acer rubrum* L., (3) *Acer saccharinum* L., (4) *Acer saccharum* Marsh., (5) *Acer* sp., (6) *Aesculus flava* Sol., (7) *Aesculus octandra* Marsh., (8) *Betula alleghaniensis* Britt., (9) *Betula lenta* L., (10) *Carya glabra* (Mill.) Sweet, (11) *Carya pallida* (Ashe) Engl. & Graebn., (12) *Carya tomentosa* Nutt., (13) *Cornus florida* L., (14) *Fagus grandifolia* Ehrh., (15) *Fraxinus americana* L., (16) *Gleditsia triacanthos* L., (17) *Halesia carolina* L., (18) *Juglans nigra* L., (19) *Juniperus virginiana* L., (20) *Liquidambar styraciflua* L., (21) *Liriodendron tulipifera* L., (22) *Magnolia acuminata* L., (23) *Nyssa sylvatica* Marsh., (24) *Picea rubens* Sarg., (25) *Pinus* sp., (26) *Pinus strobus* L., (27) *Platanus occidentalis* L., (28) *Prunus serotina* Ehrh., (29) *Quercus alba* L., (30) *Quercus falcata* Michx., (31) *Quercus montana* Willd., (32) *Quercus muehlenbergii* Engelm., (33) *Quercus prinus* L., (34) *Quercus rubra* L., (35) *Quercus* sp., (36) *Quercus velutina* Lam., (37) *Robinia pseudoacacia* L., (38) *Sorbus americana* Marsh., (39) *Tilia americana* L., (40) *Tilia heterophylla* Vent., (41) *Tsuga caroliniana* Engelm., (42) *Ulmus americana* L., (43) *Ulmus rubra* Muhl., (44) unidentified, (45) *Vitis aestivalis* Michx.

### *Incidence of lichen species in the canopy*

Although 194 lichen taxa were found in the canopy, a relatively small number dominated with respect to frequency of occurrence. Approximately 2000 specimens from the canopy were examined in the study. The most common species, based on number of specimens collected, were (number of specimens in brackets) *Punctelia rudecta* (225), *Flavoparmelia caperata* (197), *Usnea strigosa* (157), *Pyxine sorediata* (105), *Rimelia reticulata* (95), *Lecanora hybocarpa* (94), *Parmelia squarrosa* (78), *Phaeophyscia rubropulchra* (60), *Ramalina americana* (60), *Usnea rubicunda* (58), and *Physcia millegrana* (51).

TABLE 1. List of lichen species from tree canopy.

Species new to the Great Smoky Mountains National Park Herbarium are marked with an asterisk. Numbers in brackets indicate tree species on which the lichens were collected; for explanation, see text.

| Lichen Taxon | | Number of Occurrences |
|---|---|---|
| *Ahtiana aurescens* (Tuck.) Thell & Randlane | (2, 6, 16, 26) | 7 |
| *Alectoria fallacina* Mot. | (8, 24, 25) | 6 |
| **Allocetraria oakesiana* (Tuck.) Randlane & Thell | (2, 8, 19, 26) | 4 |
| *Amandinea punctata* (Hoffm.) Coppins & Scheid | (2, 17, 21, 28, 33, 39, 44) | 11 |
| *Anaptychia palmulata* (Michaux) Vainio | (10, 11, 14, 15, 20, 29, 33, 40, 44) | 14 |
| *Anzia colpodes* (Ach.) Stizenb. | (2, 10, 12, 40, 44) | 6 |
| **Arthonia pyrrhula* Nyl. | (2) | 1 |
| *Arthonia* sp. | (44) | 1 |
| **Bacidia schweinitzii* (Fr. ex Michener) A. Schneider | (2, 9, 10, 13, 15, 21, 22, 27, 29, 31, 34) | 19 |
| *Bacidia* sp. | (44) | 1 |
| *Bryoria furcellata* (Fr.) Brodo & D. Hawksw. | (24, 25, 29) | 5 |
| *Bryoria nadvornikiana* (Gyelnik) Brodo & D. Hawksw. | (26) | 1 |
| *Bryoria trichodes* (Michaux) Brodo & D. Hawksw. | (25) | 1 |
| **Buellia amphidexia* Imshaug ex R.C. Harris | (2) | 1 |
| **Buellia caloosensis* Tuck. | (2, 10, 20, 22, 34, 42) | 10 |
| **Buellia curtisii* (Tuck.) Imshaug | (2, 18) | 2 |
| *Buellia disciformis* (Fr.) Mudd | (22, 26) | 2 |

| | | |
|---|---|---|
| **Buellia imshaugiana* R. C. Harris | (44) | ? |
| *Buellia rappii* Imshaug ex R.C. Harris | (26) | 1 |
| *Buellia* sp. | (44) | 2 |
| **Bulbothrix goebelii* (Zenker) Hale | (29) | 1 |
| **Caloplaca diphasia* (Tuck.) Wetmore | (34) | 1 |
| **Caloplaca holocarpa* (Hoffm. ex Ach.) M. Wade | (20) | 1 |
| **Candelaria concolor* (Dickson) Stein | (18, 19, 21, 43) | 10 |
| **Candelaria fibrosa* (Fr.) Müll. Arg. | (10, 39, 43) | 3 |
| **Canoparmelia caroliniana* (Nyl.) Elix & Hale | (5, 9, 15-17, 26, 28, 30, 33, 35, 37, 41, 42) | 29 |
| **Catapyrenium tuckermanii* (Rav. ex Mont.) J.W. Thomson | (44) | 2 |
| *Cetrelia monachorum* (Zahlbr.) Culb. & C. Culb. | (7, 14, 29, 44) | 4 |
| *Cetrelia olivetorum* (Nyl.) Culb. & C. Culb. | (2, 16, 17, 20, 29, 40, 43, 44) | 13 |
| *Chaenothecopsis pusilla* (Ach.) A. F. W. Schmidt | (15) | 1 |
| *Chrysothrix candelaris* (L.) J.R. Laundon | (2, 18, 21, 26, 29, 34, 39, 41, 44, 45) | 16 |
| *Chrysothrix chlorina* (Ach.) J.R. Laundon | (18, 20, 26, 29, 35) | 5 |
| *Cladonia chlorophaea* (Flörke ex Sommerf.) Sprengel | (20) | 1 |
| *Cladonia coniocraea* (Flörke) Sprengel | (2, 20, 26, 36, 44) | 6 |
| *Cladonia cristatella* Tuck. | (36) | 1 |
| *Cladonia cylindrica* (A. Evans) A. Evans | (2, 20, 24, 31, 40) | 5 |
| *Cladonia didyma* (Fée) Vainio | (25, 36) | 3 |
| *Cladonia furcata* (Hudson) Schrader | (29) | 1 |
| *Cladonia macilenta* Hoffm. ssp. *macilenta* | (14, 25) | 2 |
| *Cladonia macilenta* ssp. *theiophila* Asah. | (44) | 1 |
| *Cladonia pyxidata* (L.) Hoffm. | (29) | 1 |
| *Cladonia ramulosa* (With.) J.R. Laundon | (32) | 1 |
| *Cladonia rei* Schaerer | (8) | 1 |

| | | |
|---|---|---|
| *Cladonia squamosa* Hoffm. | (8, 14, 24, 31) | 8 |
| **Collema conglomeratum* Hoffm. | (18) | 2 |
| **Collema furfuraceum* (Arnold) Du Rietz | (4, 7, 10, 18, 34, 39, 42) | 7 |
| *Collema nigrescens* (Hudson) DC. | (21, 39, 40) | 4 |
| **Collema subflaccidum* Degel. | (7, 13, 15, 20, 27, 34, 39, 40) | 14 |
| *Conotrema urceolatum* (Ach.) Tuck. | (2, 15) | 2 |
| *Evernia* sp. | (44) | 2 |
| *Flavoparmelia caperata* (L.) Hale | (2-10, 12-16, 18-22, 26-29, 31, 33, 34, 37-45) | 184 |
| **Flavopunctelia flaventior* (Stirton) Hale | (2, 6, 8, 20, 38, 41) | 9 |
| **Graphis anfractuosa* Eschw. | (42) | 1 |
| **Graphis desquamescens* (Fée) Zahlbr. | (10) | 1 |
| **Graphis lineola* Ach. | (2, 7) | 3 |
| *Graphis scripta* (L.) Ach. | (21, 27, 34, 38) | 4 |
| *Graphis* sp. | (44) | 1 |
| **Heterodermia albicans* (Pers.) Swinscow & Krog | (9, 29, 35) | 4 |
| *Heterodermia casarettiana* (Massal.) Trevisan | (2, 9, 20, 24, 29, 40, 43) | 11 |
| **Heterodermia echinata* (Taylor) Culb. | (10, 33) | 2 |
| **Heterodermia granulifera* (Ach.) Culb. | (9, 44) | 2 |
| *Heterodermia hypoleuca* (Muhl.) Trevisan | (15, 17, 40) | 4 |
| *Heterodermia leucomelos* (L.) Poelt | (2) | 1 |
| *Heterodermia obscurata* (Nyl.) Trevisan | (2, 5, 6, 8, 10, 15, 17, 19, 21, 22, 27-30, 34, 35, 40) | 32 |
| **Heterodermia speciosa* (Wulfen) Trevisan | (2, 4, 8, 9, 14, 15, 17-21, 27, 29, 31, 33, 40) | 33 |
| *Hypogymnia krogiae* Ohlsson | (8, 10, 24, 38) | 5 |
| *Hypogymnia physodes* (L.) Nyl. | (8, 38) | 3 |
| *Hypotrachyna imbricatula* (Zahlbr.) Hale | (28) | 1 |
| **Hypotrachyna livida* (Taylor) Hale | (2, 6, 8, 10, 16, 20, 21, 24, 26, 28, 29, 39, 40, 41, 42, 44) | 39 |

| | | |
|---|---|---|
| **Hypotrachyna osseoalba* (Vainio) Park & Hale | (6, 29) | 2 |
| *Hypotrachyna revoluta* (Flörke) Hale | (19) | 1 |
| *Hypotrachyna rockii* (Zahlbr.) Hale | (2, 38) | 2 |
| *Imshaugia aleurites* (Ach.) S.F. Meyer | (24-26, 38, 40) | 11 |
| **Imshaugia placorodia* (Ach.) S.F. Meyer | (10) | 1 |
| **Japewia* sp. | (40) | 1 |
| **Lecanora albella* var. *rubescens* (Imshaug & Brodo) Lumbsch | (7, 29) | 2 |
| *Lecanora argentata* (Ach.) Malme | (2, 22, 29) | 3 |
| **Lecanora caesiorubella* ssp. *glaucomodes* (Nyl.) Imshaug & Brodo | (2) | 3 |
| *Lecanora caesiorubella* ssp. *prolifera* (Fink) R.C. Harris | (20, 26, 28, 34) | 6 |
| **Lecanora cenisia* Ach. | (29, 38) | 2 |
| *Lecanora cinereofusca* var. *appalachensis* Brodo | (26) | 1 |
| **Lecanora hybocarpa* (Tuck.) Brodo | (2, 3, 6, 7, 9, 10, 16, 18, 20-22, 24, 26-29, 33-36, 38-40, 43, 44) | 83 |
| *Lecanora imshaugii* Brodo | (2, 7, 10, 14, 34) | 6 |
| *Lecanora pulicaris* (Pers.) Ach. | (10, 29) | 2 |
| *Lecanora strobilina* (Sprengel) Kieffer | (34) | 1 |
| *Lecanora symmicta* (Ach.) Ach. | (9, 33, 34, 38, 43) | 8 |
| **Lecanora varia* (Hoffm.) Ach. | (2, 17, 20, 26-29, 34, 35, 43-45) | 22 |
| *Lecanora* sp. | (44) | 1 |
| *Leproloma membranaceum* (Dickson) Vainio | (8, 29, 38, 41) | 10 |
| **Leptogium austroamericanum* (Malme) C. W. Dodge | (2, 5, 7, 18, 21, 27, 40, 43) | 11 |
| *Leptogium burnetiae* C.W.Dodge | (7, 43) | 2 |
| *Leptogium chloromelum* (Sw. ex Ach.) Nyl. | (15) | 5 |
| **Leptogium corticola* (Taylor) Tuck. | (2, 10, 11, 15, 23, 27, 39, 40) | 11 |
| *Leptogium cyanescens* (Rabenh.) Körber | (2, 4, 6, 7, 10, 13, 15, 18, 21, 22, 27, 34, 39, 40, 42) | 33 |
| *Leptogium* sp. | (44) | 2 |

| | | |
|---|---|---|
| **Leptoraphis atomaria* (Ach.) Szat. | (44) | 1 |
| **Lithothelium* sp. | (4) | 1 |
| *Lobaria pulmonaria* (L.) Hoffm. | (2, 6, 7, 9, 15, 20, 32, 40, 42) | 25 |
| *Lobaria quercizans* Michaux | (4, 20, 40) | 7 |
| **Loxospora pustulata* (Brodo & Culb.) R.C. Harris | (2, 4, 6, 10, 12, 13, 17, 19, 20, 22, 29, 31, 33, 34, 40, 41) | 37 |
| **Maronea constans* (Nyl.) Hepp | (20, 28, 29, 31, 44) | 7 |
| *Melanelia exasperata* (De Not.) Essl. | (44) | 1 |
| **Melanelia exasperatula* (Nyl.) Essl. | (2) | 1 |
| *Melanelia subaurifera* (Nyl.) Essl. | (15) | 1 |
| *Micarea endocyanea* (Tuck. ex Willey) R.C. Harris | (29) | 2 |
| *Myelochroa aurulenta* (Tuck.) Elix & Hale | (2, 6, 7, 9, 10, 13, 17, 20, 21, 29, 34, 39, 40, 41, 43, 44) | 38 |
| *Myelochroa galbina* (Ach.) Elix & Hale | (2, 9, 20, 29, 38) | 6 |
| **Myelochroa obsessa* (Ach.) Elix & Hale | (33) | 1 |
| *Normandina pulchella* (Borrer) Nyl. | (8, 15, 21, 39) | 5 |
| **Ochrolechia africana* Vainio | (2, 26) | 3 |
| **Ochrolechia farinacea* Howard | (40) | 1 |
| **Ochrolechia pseudopallescens* Brodo | (44) | ? |
| **Ochrolechia yasudae* Vainio | (31, 44) | 2 |
| *Pannaria rubiginosa* (Ach.) Bory | (15, 20, 40) | 3 |
| *Parmelia saxatilis* (L.) Ach. | (1-5, 10, 17, 18, 21, 28, 29, 31, 33, 38-40, 44, 45) | 40 |
| *Parmelia squarrosa* Hale | (2-5, 7, 9, 10, 12, 15, 17, 20-22, 24, 28-30, 32-34, 38-42, 44, 45) | 69 |
| *Parmelinopsis horrescens* (Taylor) Elix & Hale | (5, 6, 9, 10, 17, 26, 28, 29, 41) | 12 |
| *Parmelinopsis minarum* (Vainio) Elix & Hale | (2, 17, 20-22, 28, 29, 31, 33-35, 39, 41) | 36 |
| *Parmeliopsis capitata* R.C. Harris | (44) | 1 |
| *Parmotrema arnoldii* (Du Rietz) Hale | (2, 26, 29, 38, 42) | 5 |

| | | |
|---|---|---|
| **Parmotrema austrosinense* (Zahlbr.) Hale | (9, 10, 18, 26) | 4 |
| *Parmotrema chinense* (Osbeck) Hale & Ahti | (2, 7, 10, 15, 18, 20, 21, 29, 33, 42, 44, 45) | 18 |
| *Parmotrema crinitum* (Ach.) Choisy | (2, 9, 10, 13, 14, 33, 36, 37, 40) | 16 |
| *Parmotrema dilatatum* (Vainio) Hale | (44) | 1 |
| **Parmotrema eurysacum* (Hue) Hale | (10, 20) | 2 |
| **Parmotrema hypotropum* (Nyl.) Hale | (16, 20, 26, 29, 39, 41, 44) | 12 |
| **Parmotrema michauxianum* (Zahlbr.) Hale | (2, 5, 16, 26, 40) | 6 |
| **Parmotrema perforatum* (Jacq.) A. Massal. | (20, 21, 26, 28) | 4 |
| *Parmotrema stuppeum* (Taylor) Hale | (2, 19, 20, 27, 28, 29, 39) | 13 |
| **Parmotrema tinctorum* (Delise ex Nyl.) Hale | (2, 29) | 2 |
| *Pertusaria amara* (Ach.) Nyl. | (5, 12, 13, 15) | 4 |
| **Pertusaria copiosa* Erichsen | (44) | 1 |
| *Pertusaria macounii* (Lamb) Dibben | (29) | 1 |
| **Pertusaria multipunctoides* Dibben | (9, 10, 44) | 3 |
| **Pertusaria neoscotica* Lamb | (10, 29) | 2 |
| **Pertusaria ophthalmiza* (Nyl.) Nyl. | (4, 9, 41) | 4 |
| *Pertusaria ostiolata* Dibben | (11) | 1 |
| *Pertusaria paratuberculifera* Dibben | (29, 33, 40) | 4 |
| **Pertusaria propinqua* Müll. Arg. | (10, 14) | 2 |
| *Pertusaria texana* Müll. Arg. | (40) | 1 |
| **Pertusaria valliculata* Dibben | (8, 10, 21, 29, 40) | 5 |
| *Pertusaria velata* (Turner) Nyl. | (2, 7, 10, 20, 29, 33, 38) | 10 |
| *Pertusaria waghornei* Hulting | (4, 7, 14, 24, 27, 31, 38) | 10 |
| *Pertusaria* sp. | (44) | 1 |
| *Phaeophyscia ciliata* (Hoffm.) Moberg | (18, 20) | 2 |
| **Phaeophyscia hispidula* (Ach.) Essl. | (44) | 1 |

| | | |
|---|---|---|
| **Phaeophyscia imbricata* (Vainio) Essl. | (11, 38, 40) | 3 |
| *Phaeophyscia orbicularis* (Necker) Moberg | (29, 44) | 4 |
| **Phaeophyscia pusilloides* (Zahlbr.) Essl. | (11) | 1 |
| *Phaeophyscia rubropulchra* (Degel.) Essl. | (1, 3, 10, 12, 13, 15, 17, 19, 21, 22, 27, 29, 34, 39, 40, 42, 43, 44) | 52 |
| **Phlyctis willeyi* Tuck. | (4) | 1 |
| *Physcia aipolia* (Ehrh. ex Humb.) Fürnr. | (2, 7, 18, 20, 28, 29, 33, 39, 42-44) | 22 |
| *Physcia americana* G. Merr. | (18, 19, 21, 25, 27, 29) | 12 |
| **Physcia millegrana* Degel. | (2, 21, 27-29, 33, 35) | 49 |
| **Physciella chloantha* (Ach.) Essl. | (19, 39, 43) | 9 |
| **Physconia detersa* (Nyl.) Poelt | (40, 43) | 2 |
| **Physconia enteroxantha* (Nyl.) Poelt | (15, 18) | 3 |
| *Platismatia glauca* (L.) Culb. & C. Culb. | (6, 7, 15, 33) | 4 |
| *Platismatia tuckermanii* (Oakes) Culb. & C. Culb. | (2, 24-26, 28, 33, 34) | 20 |
| *Pseudevernia consocians* (Vainio) Hale & Culb. | (9, 24, 25, 31, 34) | 9 |
| **Pseudocyphellaria aurata* (Ach.) Vainio | (18, 43) | 3 |
| *Pseudocyphellaria crocata* (L.) Vainio | (15, 20) | 3 |
| *Pseudosagedia chlorotica* (Ach.) Hafellner & Kalb | (44) | 1 |
| *Punctelia appalachensis* (Culb.) Krog | (7, 17, 40) | 5 |
| *Punctelia bolliana* (Müll. Arg.) Krog | (29) | 1 |
| **Punctelia hypoleucites* (Nyl.) Krog | (18) | 1 |
| **Punctelia missouriensis* Wilhelm & Ladd | (41) | 1 |
| **Punctelia perreticulata* (Räsänen) Wilhelm & Ladd | (44) | ? |
| *Punctelia rudecta* (Ach.) Krog | (1-13, 15-23, 26-31, 33-35, 37-44) | 213 |
| *Punctelia subrudecta* (Nyl.) Krog | (2, 10, 13, 14, 19, 26, 28, 29, 37, 39, 41, 44) | 17 |
| **Pyrenula punctella* (Nyl.) Trevisan | (44) | 1 |

| | | |
|---|---|---|
| *Pyrenula* sp. | (44) | 1 |
| **Pyrrhospora varians* (Ach.) R.C. Harris | (2, 18, 21, 22, 26, 28, 40, 44) | 10 |
| **Pyxine caesiopruinosa* (Tuck.) Imshaug | (2, 10, 18, 19, 21, 27, 29, 33, 34, 39, 44) | 29 |
| **Pyxine sorediata* (Ach.) Mont. | (2-4, 6, 7, 9, 10, 13, 15, 17, 18 20-22, 28, 29, 31-35, 39, 40, 42-45) | 95 |
| **Ramalina americana* Hale | (2, 7, 10, 15, 18, 20, 21, 26, 28, 29, 33, 34, 39, 40, 42, 43) | 52 |
| **Rimelia cetrata* (Ach.) Hale & Fletcher | (2, 15, 29, 34, 39) | 6 |
| **Rimelia reticulata* (Taylor) Hale & Fletcher | (2, 5-7, 9, 10, 13,15, 18-21, 26, 28, 29, 31, 33, 34, 36, 37, 39-43) | 82 |
| **Rimelia subisidiosa* (Müll. Arg.) Hale & Fletcher | (3, 6, 9, 10, 15, 26, 29, 33, 34, 41) | 18 |
| **Rimeliella subtinctoria* (Zahlbr.) Kurok. | (9, 10, 15, 27, 29, 39) | 9 |
| *Scoliciosporum umbrinum* (Ach.) Arnold | (27, 33, 34) | 3 |
| **Sphinctrina turbinata* (Pers.: Fr.) De Not | (10) | 1 |
| *Sticta beauvoisii* Delise | (2, 5, 7, 15, 18, 20, 21, 40, 43) | 20 |
| *Tuckermannopsis ciliaris* (Ach.) Gyelnik | (6, 9, 16, 25, 26, 28, 38, 41) | 25 |
| *Usnea ceratina* Ach. | (2, 6, 9, 20, 25, 26, 29, 33, 34, 38, 40-42) | 31 |
| **Usnea filipendula* Stirton | (34, 41) | 2 |
| *Usnea fulvoreagens* (Räsänen) Räsänen | (9) | 1 |
| *Usnea hesperina* Mot. | (31, 34) | 2 |
| **Usnea mutabilis* Stirton | (20, 26, 29, 34, 40, 42) | 18 |
| **Usnea rubicunda* Stirton | (2, 9, 15, 20, 26, 28, 29, 31, 33, 34, 36, 41, 42) | 46 |
| *Usnea strigosa* (Ach.) Eaton | (2, 6-8, 10, 16, 18-20, 26, 28-30, 34, 38-42) | 151 |
| *Usnea subfloridana* Stirton | (2, 9, 10, 14, 28, 33, 38) | 8 |
| *Usnea trichodea* Ach. | (36, 41) | 2 |
| *Usnea* sp. | | 2 |
| Total number of species and forms: | | 194 |

Actually, the occurrence of *Usnea strigosa* was even greater than the data indicate since this species tended to occur in groupings which were usually counted as only one organism. It has been shown that at higher elevations with greater exposure to ultraviolet light, the concentration of usnic acid increases in *U. strigosa*, thereby lending greater protection against this deleterious agent. It would be interesting to quantify the usnic acid in the other lichens occurring at the higher levels of the canopy to determine if they also respond in a similar manner to increased ultraviolet light exposure.

*Quantitative occurrence by tree species and height above ground*

A limited number of lichen studies involving lichen diversity versus tree height indicate that diversity is directly related to tree height (see references cited in McCune et al. 2000). However, the data are not definitive. The canopy data in the current study do not support this hypothesis although these results may also be based on inadequate information. Data in Table 2 appear to be relatively inconsistent and variable perhaps reflecting, among other undetermined variables, a difficulty in sound scientific sampling. Table 3, summarizing the information found in Table 2, indicates greater lichen diversity at mid to low tree levels, i.e, 1.5 to 15 m than from 15 m and up. However, diversity does not necessarily bear any relationship to total lichen biomass. No attempt was made to compare these two different aspects. Any study attempting to correlate these two factors would be extremely difficult.

TABLE 2. Lichens in the canopy; quantitative occurrence by tree species.

* = no data collected

| Tree species | Number of trees sampled | Average tree height (m) | Number of lichen specimens at different tree heights (m) | | | | Average number of lichen specimens per tree |
|---|---|---|---|---|---|---|---|
| | | | 1.5-7.5 | 7.6-15 | 15.1-22.5 | 22.6- | |
| *Acer pennsylvanica* | 1 | 31.5 | 0 | 3 | 0 | 0 | 3.0 |
| *Acer rubrum* | 7 | 22.8 | 25 | 43 | 27 | 17 | 16.0 |
| *Acer saccharum* | 4 | 22.5 | 16 | 4 | 4 | * | 6.0 |
| *Acer* sp. | 3 | 18.9 | 14 | 5 | 0 | * | 6.3 |
| *Aesculus flava* | 1 | 16.5 | 0 | 0 | 0 | * | 0.0 |
| *Aesculus octandra* | 3 | 30.0 | 0 | 1 | 2 | 27 | 10.0 |
| *Betula alleghaniensis* | 2 | 19.2 | 10 | 6 | 5 | * | 10.5 |
| *Betula lenta* | 1 | 20.4 | 3 | 30 | 14 | * | 47.0 |
| *Carya cordiformis* | 1 | 23.4 | 0 | 0 | 0 | 0 | 0 |
| *Carya glabra* | 4 | 29.4 | 4 | 14 | 40 | 16 | 18.5 |
| *Carya pallida* | 1 | 15.3 | 6 | 1 | 0 | * | 7.0 |
| *Carya tomentosa* | 1 | 24.0 | 2 | 5 | 0 | 0 | 7.0 |
| *Cornus florida* | 3 | 7.5 | 12 | 0 | 0 | * | 4.0 |
| *Fagus grandifolia* | 1 | 10.5 | 20 | 0 | 0 | * | 6.7 |
| *Fraxinus americana* | 5 | 21.6 | 6 | 29 | 24 | * | 11.8 |
| *Gleditsia triacanthos* | 1 | 25.5 | 5 | 26 | 14 | 3 | 48.0 |
| *Halesia carolina* | 4 | 28.8 | 2 | 7 | 18 | 5 | 8.0 |
| *Halesia tetrapter* | 1 | 30.0 | 0 | 0 | 0 | 0 | 0 |
| *Juglans nigra* | 6 | 24.9 | 11 | 33 | 11 | 0 | 9.2 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Juniperus virginiana* | 10 | 11.7 | 33 | 0 | 0 | * | 3.3 |
| *Liquidambar styraciflua* | 8 | 25.2 | 26 | 37 | 36 | 15 | 14.3 |
| *Liriodendron tulipifera* | 5 | 29.4 | 20 | 73 | 0 | 0 | 18.6 |
| *Magnolia acuminata* | 2 | 33.9 | 4 | 1 | 7 | 8 | 10.0 |
| *Nyssa sylvatica* | 1 | 22.5 | 0 | 1 | 2 | * | 3.0 |
| *Picea rubens* | 1 | 24.0 | 1 | 10 | 9 | 0 | 20.0 |
| *Pinus strobus* | 3 | 33.9 | 3 | 0 | 27 | 29 | 19.7 |
| *Pinus* sp. | 1 | 27.0 | 2 | 13 | 4 | 4 | 23.0 |
| *Platanus occidentalis* | 3 | 25.5 | 1 | 3 | 0 | 0 | 1.3 |
| *Prunus serotina* | 3 | 21.6 | 13 | 46 | 0 | * | 19.7 |
| *Quercus alba* | 17 | 26.7 | 33 | 136 | 70 | 0 | 14.1 |
| *Quercus falcata* | 1 | * | 6 | 0 | 0 | 0 | 6.0 |
| *Quercus montana* | 1 | 14.4 | 0 | 23 | * | * | 23.0 |
| *Quercus muehlenbergii* | 1 | * | 2 | 0 | 0 | 0 | 2.0 |
| *Quercus prinus* | 4 | 26.4 | 7 | 28 | 25 | 0 | 15.0 |
| *Quercus rubra* | 1 | 28.8 | 6 | 16 | 43 | 0 | 65.0 |
| *Quercus velutina* | 1 | 27.0 | 0 | 0 | 8 | 0 | 8.0 |
| *Quercus* sp. | 2 | 25.2 | 5 | 8 | 0 | 0 | 6.5 |
| *Sorbus americana* | 1 | 12.0 | 16 | 19 | 0 | * | 35.0 |
| *Tilia americana* | 3 | 22.5 | 9 | 15 | 6 | * | 10.0 |
| *Tilia heterophylla* | 6 | 28.5 | 7 | 22 | 44 | 23 | 16.0 |
| *Tsuga caroliniana* | 4 | 31.5 | 0 | 4 | 17 | 24 | 11.3 |
| *Ulmus americana* | 1 | 22.5 | 1 | 14 | 10 | * | 15.0 |
| *Ulmus rubra* | 4 | 21.0 | 6 | 22 | 14 | 7 | 12.3 |
| *Vitis aestivalis* | 7 | 18.9 | 3 | 7 | 0 | * | 1.4 |

TABLE 3. Average number of lichen specimens at different heights above ground.

| | Height above ground (m) | | | |
|---|---|---|---|---|
| | 1.5-7.5 | 7.6-15 | 15.1-22.5 | 22.6- |
| Number of trees sampled | 141 | 141 | 140 | 93 |
| Total number of specimens | 340 | 705 | 481 | 178 |
| Average number of specimens per tree | 2.4 | 5.0 | 3.4 | 1.9 |

**Acknowledgements** James 'Buck' Counts, Laura Henley, Damon Lesmeister, Melissa Skrabal, and Kenneth L. Snell were student tree climbers from Central Missouri State University who collected lichen samples from the tree canopy. Special thanks go to Charly Pottorff, a professional arborist, who provided tree-climbing instruction and certification for climbers. Keith Langdon from the GSMNP and Jeanie Hilten from Discover Life in America provided assistance with equipment, housing, and logistics. The multidisciplinary research team included: Drs. Alex Ciegler, lichens; Paul Davison, mosses and liverworts; Professor Uno Eliasson, Göteborg University, Sweden, myxomycetes and vascular plants; Professor Thomas Gaither, myxomycetes and macrofungi; Professor Harold W. Keller, myxomycetes; Ken Nelson, volunteer ecologist; Drs. Jay Raveill, expert on the flora of the GSMNP; David Smith, bryologist; Ted Stampfer, volunteer moist chamber culture specialist. This research project was funded by the National Science Foundation, Division of Environmental Biology, Biotic Surveys and Inventories Program, Award # DEB-0079058 and Discover Life in America Awards #2001-26 and #2002-17.

## Literature Cited

Brodo, I. .M., S. D. Sharnoff & S. Sharnoff. 2001. Lichens of North America. Yale University Press, New Haven, CT.

Ciegler, A. 1999. A catalogue of Tennessee Lichens, revisited. Evansia 16: 113-129.

Counts, J., L. Henley, M. Skrabal & K. D. Snell. 2000. Tree canopy biodiversity in the Great Smoky Mountains National Park. Inoculum 51 (6): 1-5.

Degelius, G. 1941. Contributions to the lichen flora of North America. II. The lichen flora of the Great Smoky Mountains. Arkiv för Botanik 30A: 1-80.

Esslinger, T. L. & R. S. Egan. 1995. A sixth checklist of the lichen-forming, lichenicolous, and allied fungi of the continental United States and Canada. The Bryologist 98: 467-549.

Hale, M. E. 1979. How to Know the Lichens. Wm. C. Brown Co. Publishers, Dubuque, Iowa.

Keller, H. W. & M. Skrabal. 2002. Discovery of a new obligate tree canopy myxomycete in the Great Smoky Mountains National Park. Inoculum 53 (2): 1-4.

McCune, B., R. Rosentreter , J. M. Pouzetti & D. C. Shaw. 2000. Epiphyte habitats in an old conifer forest in western Washington, USA. The Bryologist 103: 417-427.

Parker, G. G. 1995. Structure and microclimate of forest canopies. p. 73-106. In Lowman, M. D. & N. M. Nadkarni. (eds.). Forest Canopies. Academic Press, San Diego, California.

Shanks, R. E. 1954. Climates of the Great Smoky Mountains. Ecology 35: 354-361.

---

# Correction to Authorship

## A Catalog and Brief History of the Lichen Flora of Alabama

**Curtis J. Hansen**

Evansia 20(3): 59-101 (2003)

During the editorial process the author and part of the authors address were combined resulting in an incorrect author line. The correct authorship for the paper is Curtis J. Hansen. The Author is curator of the John D. Freeman Herbarium (AUA) at Auburn University in Alabama.

# An Unusual Ammonia-affected Lichen Community on the Oregon Coast

Bruce McCune[1]

Clean air and diverse habitats make the coast of Oregon an excellent area to explore for lichens. Because the coast has not been well studied, interesting finds are fairly frequent. But in fifteen years of off-and-on lichenizing on the coast, I had seen nothing like the epiphyte communities along the lower Wilson River near Tillamook. This note reports what I found and suggests an explanation for the unusual local lichen communities.

The Wilson is one of several rivers flowing out of the Coast Range, onto an expanse of sodden flats bordering Tillamook Bay. This large complex of wetlands includes estuaries, freshwater marshes, seasonal wetlands, drainage ditches, and dikes. These lowlands support a dairy industry with many feedlots and pastures. Tillamook County has approximately 40,000 cattle. It is the only county in Oregon where the majority of the cattle are dairy cattle (Loy 2001). Based on the approximate area of the flats around Tillamook Bay, I estimated the cattle density to be about 400 head/km$^2$. Because many are concentrated into feedlots, local density can be much higher or lower than this. The olfactory effect can be pronounced.

The largest town in the Tillamook Bay area is Tillamook itself, with about 4270 residents in 2000. The whole county has a population of 24,100. Winters are cool and wet while summers are cool and much drier, but still humid and often foggy. With a total precipitation averaging 225 cm, it is about twice as wet as the cities in the Willamette Valley (Taylor & Hannan 1999). Mean temperatures in January and July are 6.0°C and 14.6°C, respectively. July is relatively dry, with an average monthly total of 4 cm of precipitation, while total January precipitation averages 34 cm.

In April 2003 I explored the area near the mouth of the Wilson River near 45° 28.6'N 123° 52.9'W, just slightly above sea level, 3-4 km NW of city center and near the NW edge of the flats used by the dairy industry. This part of the Wilson River is estuarine, with tidal fluctuations in water level. Because of heavy recent rains, the water levels were high, allowing me access only to the dikes, roads, riverbanks, and not-so-inundated flats. These habitats had rows and small

[1] Dept. Botany & Plant Pathology, Cordley 2082, Oregon State University, Corvallis OR 97331-2902 U.S.A. E-mail: Bruce.McCune@science.oregonstate.edu

patches of hardwood trees (*Salix* spp., *Alnus rubra* Bong.) and shrubs (*Cytisus scoparius* (L.) Link, *Sambucus* sp.), and occasional clumps of conifers (*Picea sitchensis* (Bong.) Carr. and *Pinus contorta* Dougl.).

Initially I was struck by the abundance of two unusual species for the Oregon coast, *Hypotrachyna revoluta* and *Xanthoria parietina* (Table 1; vouchers in OSC). It was odd enough just to find them at all, and even more unusual to find them so abundant. Just as unusual was the absence of many of the common elements of the coastal lichen flora, including species of *Hypogymnia, Lobaria, Platismatia,* and *Pseudocyphellaria.*

**Table 1. Epiphytic macrolichens near the lower Wilson River, grouped by their presumed response to local ammonia pollution from cattle. More detailed quantitative work is needed to expand these lists.**

| Less common than usual | More common than usual |
|---|---|
| **Extreme decreasers (expected but not seen)**<br>*Hypogymnia apinnata* Goward & McCune<br>*H. heterophylla* L. Pike<br>*Leptogium* spp.<br>*Lobaria* spp.<br>*Peltigera collina* (Ach.) Schrader<br>*Platismatia* spp.<br>*Pseudocyphellaria* spp. | **Increasers (abundant)**<br>*Parmotrema chinense* (Osb.) Hale & Ahti<br>*Physcia tenella* (Scop.) DC.<br>*Ramalina farinacea* (L.) Ach. |
| **Decreasers (seen but sparse)**<br>*Cladonia squamosa* Hoffm.<br>*C. transcendens* (Vainio) Vainio<br>*Ramalina menziesii* Taylor | **Invaders (normally absent)**<br>*Hypotrachyna revoluta* (Flörke) Hale<br>*Xanthoria parietina* (L.) Th. Fr. |

*Hypotrachyna revoluta* is known in Oregon from only a few locations near the coast. Despite its rarity, it is not on the state's Heritage Program list (Oregon Natural Heritage Program 2001). It was, however, included as a Category 3 species in the Northwest Forest Plan (USDA and USDI 1994) and a category E in the amended list (USDA and USDI 2001). Category 3 was "conduct extensive surveys and manage sites." Category E is "Rare, status undetermined."

Goward et al. (1994) characterized *H. revoluta* as "frequent over trees and acid rock in open to somewhat sheltered hypermaritime sites." This overstates its abundance, considering that the species was not found by Noble (1982), nor were any specimens of this present in the UBC herbarium in 1999. Reappraising the species, Goward (pers. comm. 2003) described it as "rare or infrequent, but locally common," all of the locations in BC being in the Tofino area of Vancouver Island.

A sizeable population is known from only one other site in Oregon, in an *Alnus rubra* stand on top of Cascade Head. Even so, this population does not even come close in total numbers or extent to the population near the lower Wilson River. Based on this new site, it seems possible that *H. revoluta* is a nitrophile and likely to be spreading in the Tillamook area. Four additional sites for *H. revoluta* are known in Tillamook County and one in Clatsop County (specimens cited below). Arguing against nitrophily of *H. revoluta* is its listing as anitrophytic to moderately nitrophytic by Wirth (1995).

Before now, *Xanthoria parietina* was reported from Oregon only in the Willamette Valley (McCune & Geiser 1997). This species appears to be rapidly expanding in numbers and extent in Oregon. Several pieces of evidence support this. No specimens collected in Oregon before 1990 are known to me, despite it being a conspicuous species. It is now fairly easy to find in certain areas along the Willamette and Santiam Rivers in the Willamette Valley. When we moved into our current house in the Willamette Valley in 1987, I found several individuals in three places in my yard: on an ornamental *Salix*, a *Cornus florida* L., and on the weathered fiberglass roof of a chicken coop. In the 15 years since then it has multiplied (unaided by me) and now resides on at least half of the woody plants in our yard.

Similarly, specimens from elsewhere in the northwest states and provinces are all recent. Lindblom (1997) cited only two specimens from British Columbia, one from Washington, and two from Oregon, all from the 1990s. Older specimens are known from California, including San Clemente Island in 1903, Contra Costa Co. in 1964, Humboldt Co. in 1972 (Lindblom 1997).

The apparent absence of *X. parietina* on the immediate Oregon coast has been puzzling. In other areas of the world, such as Europe and New England, it is a coastal species. Why was it missing on Oregon coast? Perhaps it had simply not yet arrived there. If indeed the habitat is suitable on our coast, then *X. parietina* can be expected to increase in abundance.

The unusual lichen communities on the lower Wilson River are probably a response to ammonia pollution, directly and indirectly, from the local dairy industry. This idea is supported by the abundance of nitrophiles (especially *Physcia tenella* and *Xanthoria* spp.), the absence of epiphytic cyanolichens (*Lobaria, Nephroma, Peltigera,* and *Pseudocyphellaria*), and the absence of species normally abundant on acidic substrates on the Oregon coast (*Hypogymnia* *apinnata, H. heterophylla*, and *Platismatia* spp). Several specific pollution sources are likely: direct ammonia release from cattle urine and manure, ammonia release from mineralization of organic nitrogen in waterlogged manure-enriched soils, and ammonia similarly gassing off from the river and other contaminated waterways.

Tillamook Bay is close to some sites well known for populations of rare lichens, particularly Cape Lookout (McCune et al. 1997; McHenry & Tønsberg 2002). Are these areas jeopardized by ammonia pollution from the Tillamook area? Although the question should be studied carefully, it is possible that the ammonia pollution is relatively local. Ammonia is highly reactive, is readily adsorbed to surfaces, and tends to drop off rapidly with distance from source areas (Asman et al. 1998, de Bakker 1989, van Herk 1999, 2001).

Two problems deserve further work. We should compare the epiphytic lichen communities of the Tillamook Bay area with other estuarine lowlands north and south of Tillamook. This should help to establish the extent of the phenomenon. We know already that *X. parietina* on Bayocean Peninsula between Tillamook Bay and the open ocean (see L. Geiser collection cited below). Does this community extend north or south of Tillamook Bay?

We should also seek more conclusive evidence that ammonia is indeed the agent responsible for the differences in lichens, perhaps through comparing direct measurements of ammonia deposition, nitrogen content of lichens, and bark pH with measurements from other nearby estuaries.

***Hypotrachyna revoluta*** (all specimens in OSC and herb. McCune)

**U.S.A. OREGON**: CLATSOP CO., Ecola State Park, Tillamook Head, on *Picea*, July 2000, *Mikulin 1089*. LANE CO., just south of Siltcoos River, Waxmyrtle Camp, on *Cytisus*, May 2000, *McCune 25319*. LINCOLN CO., Salmon River between Otis and Rose Lodge, on *Picea*, December 1995, *McCune 22914*; South Jetty, entrance to Yaquina Bay, on rock, November 1997, *McCune 23907*. TILLAMOOK CO., Cape Lookout, on *Picea*, July 1996, *McCune 23136*; on *Alnus rubra*, August 2000 *Mikulin 1119*; Cascade Head, on *Alnus rubra*, *Mikulin 1045*; on *Alnus rubra*, October 1997, *McCune 23872, 23875*; SE of Garibaldi, on *Alnus rubra*, October 20001, *Mikulin 1238*; near Neskowin, on *Picea*; September 2000, *Mikulin 1211*; mouth of Wilson River, on *Alnus*, *Cytisus, Pinus contorta*, and *Sambucus*, April 2003, *McCune 26936, 26940, 26950, 26961.*

*Xanthoria parietina*

**U.S.A. Oregon**: Tillamook Co., Bayocean Peninsula, Pitcher Point, on *Picea*, March 2001, *Geiser 7097*; mouth of Wilson River, on *Sambucus*, April 2003, *McCune 26949*.

**Acknowledgements.** Thanks to Sarah Jovan and Linda Geiser for improving the manuscript, to Trevor Goward for information on *Hypotrachyna revoluta* in BC, to Alexander Mikulin for finding additional sites for *H. revoluta*. Linda Geiser kindly provided unpublished data from the Tillamook area.

## Literature Cited

Asman, W. A. H., M. A. Sutton, & J. K. Schjørring. 1998 Ammonia: emission, atmospheric transport and deposition. New Phytologist 139:27-48.

de Bakker, A. J. 1989. Effects of ammonia emission on epiphytic lichen vegetation. Acta Botanica Neerlandica 38:337-342.

Goward, T., B. McCune, and D. Meidinger. 1994. The Lichens of British Columbia. Part 1. Foliose and Squamulose Species. British Columbia Ministry of Forests. Crown Publications Inc., Victoria, B.C. 181 pp.

Lindblom, L. 1997. The genus *Xanthoria* (Fr.) Th. Fr. in North America. Journal of the Hattori Botanical Laboratory 83:75-172.

Loy, W. G. (ed.) 2001. Atlas of Oregon. 2nd edition. University of Oregon Press, Eugene.

McCune, B. and L. Geiser. 1997. Macrolichens of the Pacific Northwest. Oregon State University Press, Corvallis.

McCune, B., R. Rosentreter & A. DeBolt. 1997. Biogeography of rare lichens from the coast of Oregon. Pages 234-241 *in* Conservation and Management of Native Flora and Fungi. T. N. Kaye et al., editors. Native Plant Society of Oregon, Corvallis.

McHenry, G. & T. Tønsberg. 2002. *Heterodermia sitchensis* found in Oregon, U.S.A. Evansia 19:158-160.

Noble, W. J. 1982. The Lichens of the Coastal Douglas-Fir Dry Subzone. PhD Thesis, Univ. British Columbia, 942 pp.

Taylor, G. H. & C. Hannan. 1999. The climate of Oregon: from rain forest to desert. Oregon State University Press, Corvallis.

U. S. Department of Agriculture and U. S. Department of Interior. 1994. Record of decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the Northern Spotted Owl. Attachment A: Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl. U. S. Government Printing Office, 1994-589-11/0001, Washington, D. C.

U. S. Department of Agriculture and U. S. Department of Interior. 2001. Record of decision and standards and guidelines for amendments to the survey and manage, protection buffer, and other mitigation measures standards and guidelines. U. S. D. A. Forest Service, Portland. 86 pages.
van Herk, C. M. 1999. Mapping of ammonia pollution with epiphytic lichens in the Netherlands. Lichenologist 31:9-20.
-----------. 2001. Bark pH and susceptibility to toxic air pollutants as independent causes of changes in epiphytic lichen composition in space and time. Lichenologist 33:419-441.
Wirth, V. 1995. Die Flechten Baden-Württembergs. Ulmer, Stuttgart.

---

## All India Publications

The largest online bookstore from India with over 100,000 titles published from India on a variety of subjects offer books on the Internet. A recent e-mail listed a large number of lichen books that are available at www.allindiapublication.com.

They also offer free air-mail delivery for purchases.

Some of the titles listed are:

American Arctiv Lichens: The Macrolichens, J. W. Thomson, 2002 $70
Biology of Lichens, K.G. Mukerji et al., 1999 $70
Catalogus Lichenum Universalis (10 vol) A. Zahlbruckner, 2003 $937
Field Guide to the Common Lichens of Corbett Tiger Reserve,
    D. K. Upreti & S. Nayaka, 2003 $12
Hand Book of Lichens, D. D. Awasthi, 2000 $19
Lichens of the Himalayas, G. L. Chopra, 1982 $12
Monograph of the Lichen Genus *Dirinaria*, Awasthi,1996 $45

## *Trichostomum portoricense* new to the state of Texas

**P. M. Eckel**[1]

While preparing a treatment of the genus *Gymnostomum* for the Flora of North America project, I found that a specimen misidentified as *G. aeruginosum* Sm. from Texas was actually the rare *Trichostomum portoricense* Crum & Steere. *Trichostomum portoricense* was originally described from Puerto Rico from collections made in the Arecibo area (Crum & Steere. 1956). Zander (1982) noted its occurence in Haiti, Jamaica and Mexico (Tamaulipas). In the United States it has been found in Louisiana (St. Tammany Parish). Additional Mexican stations have been reported from Campeche, Guerrero, San Luis Potosi, Tamaulipas, Veracruz and Yucatan with additional stations in Guatemala and the Bahamas (Zander 1994). Allen (2002) noted further stations from Central America in Belize, Guatemala and Honduras.

This species appears to have a geographic distribution as discussed by Schofield (Schofield, 1980, see also Pursell & Reese 1970, Schornherst, 1943, and Sharp, 1939) for endemic species of the Americas shared between the United States and areas southward. It joins 70 other endemics with this distribution, of which the only other species in the Pottiaceae mentioned by Schofield is *Gymnostomum orcuttii* Bartr.

*Trichostomum portoricense* is one of several species in this group that is characteristic of "humid limestone cliffs." This circum-Mexican Gulf coast element is "most richly represented ... in the 'forested river valleys and gorges' of the Gulf Coastal Plain" (Pursell & Reese 1970, as cited by Schofield, 1980). The distribution of *Trichostomum portoricense* conforms closely with that mapped for *Fissidens kegelianus* C. Muell. (Schofield, 1980, after Pursell & Reese, 1970). These authors indicate that the relationship of this flora is essentially tropical, the avenue of approach being through the Carribbean Islands to Florida, where the greatest concentration of species with this distribution occurs in the United States. Another, secondary, avenue of migration (or relictual pattern) for this group is north through the mainland Gulf Coast and adjacent areas of Mexico.

Additional stations of *Trichostomum portoricense* are to be looked for in the state of Florida and in Cuba. It may be confused with *Tuerckheimia svihlae* (Bartr.) Zander, which occurs in Florida as both species have long, linear leaves, two stereid bands and massive, multiplex papillae over the lumens, weakly radiculose at the stem bases:

---

[1] P. O. Box 299, Missouri Botanical Garden, St. Louis, MO 63166-0299.

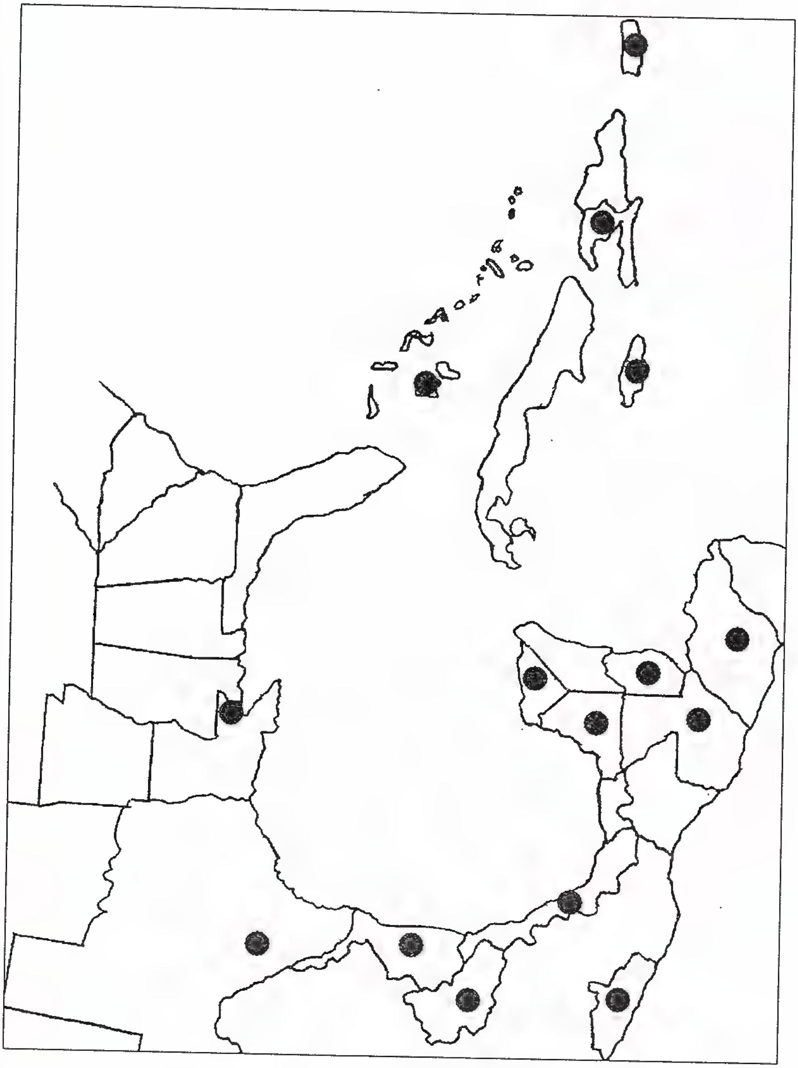


Figure 1: The known distribution of *Trichostomum portoricense* Crum & Steere in the coastal plain Gulf of Mexico and adjacent regions.

1. Stem sclerodermis present; stem leaves yellow-green, fragile, deteriorating; leaves keeled (with central groove along the costa), apex obtuse to broadly acute with a small, sharply differentiated, smooth-celled mucro; adaxial stereid band weak; basal cells strongly differentiated, long-elliptic, thick-walled........................................*Trichostomum molariforme.*
1. Stem sclerodermis none or weakly differentiated; stem leaves glaucous, bluish-green, not fragile; leaves canaliculate, apex narrowly acute to long-apiculate with a gradually differentiated mucro variously papillose to smooth; adaxial stereid band well developed; basal cells relatively undifferentiated, in a small area at the base of the leaf, relatively thin-walled, quadrate to short-rectangular ......................... *Tuerckheimia svihlae.*

## Specimen Cited

*Trichostomum portoricense* Crum & Steere. USA, Texas, Bandera Co., Sabinal Canyon, ca. 5 miles N of Vanderpool; deep valley of the Sabinal River cut through limestone; with *Celtis*, *Juglans*, *Acer*, *Platanus*; on limestone flaking off from a moist cliff face, July 11, 1963, William D. Reese 6554 (MO).

## Literature Cited

Allen, B. 2002. Moss Flora of Central America. Part 2. Encalyptaceae - Orthotrichaceae. Monographs in Systematic Botany from the Missouri Botanical Garden. Vol. 90. St. Louis.

Crum, H. & W. C. Steere. 1956. Puerto Rican Musci, new species and new combinations. Bryologist 59: 246-255.

Pursell, R. A. & W D. Reese. 1970. Phytogeographic affinities of the mosses of the Gulf Coastal Plain of the United States and Mexico. J. Hattori Bot. Lab. 33:115-152.

Schofield, W. B. 1980. Phytogeography of the mosses of North America (north of Mexico). in The Mosses of North America, R. J. Taylor & A. E. Leviton, eds. Pacific Division of the American Association for the Advancement of Science. California Academy of Sciences. San Francisco. pp. 131-170.

Sharp, A. J. 1939. Tropical bryophytes in the Southern Appalachians. Ann. Bryol. 11:141-144.

Schornherst, R. D. 1943. Phytogeographic studies of the mosses of northern Florida. Amer. Midl. Nat. 29:509-532.

Zander, R. H. 1982. *Trichostomum_molariforme* sp. nov. and *Atractylocarpus stenocarpus* (Wils. in Seem.) comb. nov. Bryologist. 85(1):126-128.

Zander, R. H. 1994. *Trichostomum* in Sharp, A. J., H. Crum & P. M. Eckel. The Moss Flora of Mexico. 2 Vols. Memoirs of the New York Botanical Garden Vol. 69. New York.

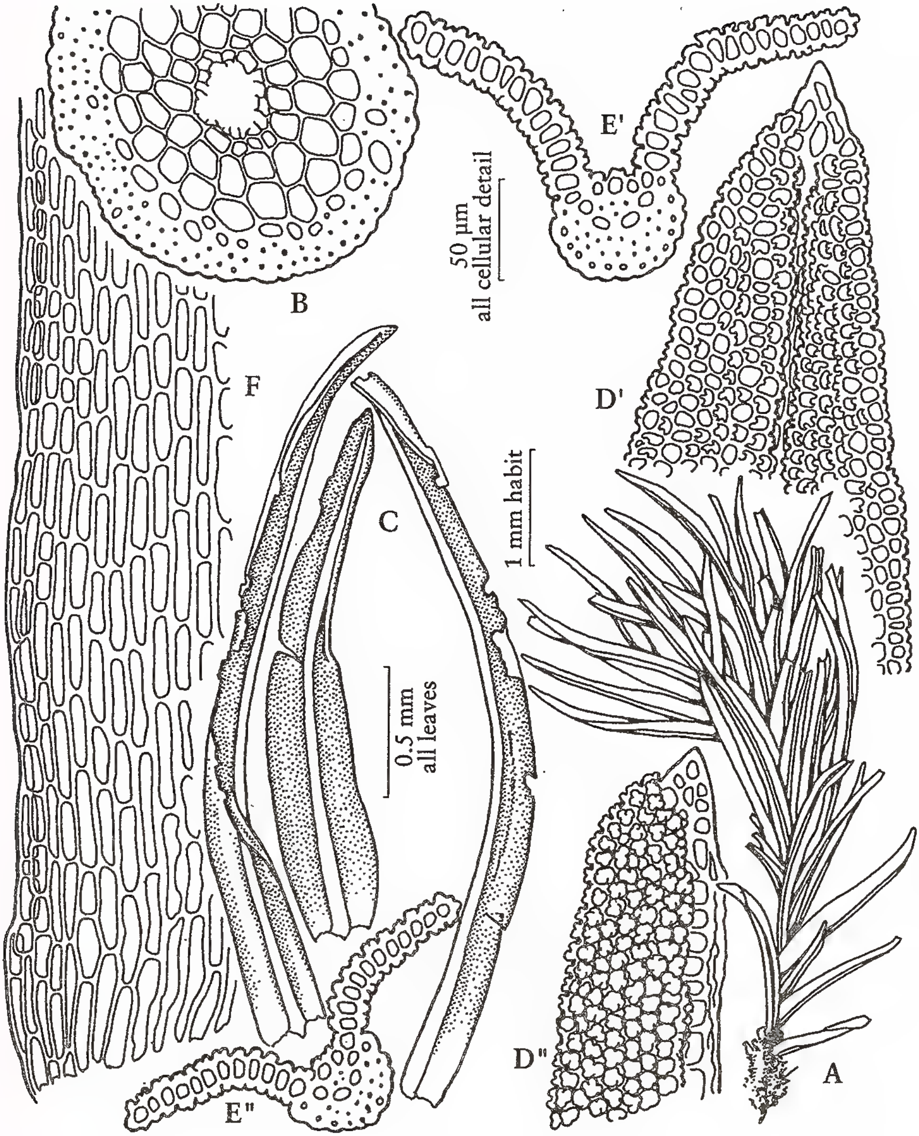


Figure 2: *Trichostomum portoricense* Crum & Steere. a. Habit. b. Stem cross-section. c. Leaves. d. Leaf apices, with and without papillae. e. Leaf cross-sections. f. Basal cells.

# Mosses from a North Slope Borehole

**Carl E. Darigo** [1]

A recent assignment took the author's daughter to Alaska's Prudhoe Bay oil producing region on the North Slope to perform geologic assessments of drill core materials. The work site, well above the Arctic Circle at 6° North, was approximately three miles south of the Beaufort Sea and 55 miles east of Prudhoe Bay. The landscape is very bleak, flat (approximately 25 feet elevation) and windy; temperature at time of the work was in the 15° F range. The surface was completely covered with a six-inch snow pack concealing the tundra, which is exposed in summer for approximately three to four months after snow has melted. Surface vegetation in the area is represented by moist or wet tundra lying on the treeless Arctic coastal plain, among a mosaic of small ponds and polygonal ground, caused by thermal contraction and ice-wedging of the ground surface (Ferrians, et al., 1969; Selkregg, 1975).

Drilling was conducted with an eight-inch diameter auger, containing a four-inch diameter center opening. Typically when a sample is desired, drilling is stopped and a core inserted into the hollow drill to collect material, which is then removed. Drilling at this site was completed to a depth of 65 feet. Below the snow cover lay two feet of tundra, the top six inches live organic material and the lower 18 inches organic-rich silt. Next was four feet of ice, commonly called ground ice, which occurs as wedge-ice around the perimeters of polygons. Permafrost soils containing gravel and sand lay beneath the ice. In this particular instance, the driller stopped after penetrating the snow layer, and removed the drill to check for ice and surface soil. Extracted with the drill was organic material, which might normally be discarded. Seeing green plants in the material and knowing the author's interest in bryophytes, the substance was saved for later investigation.

The collection, and approximate four inch diameter ball, was carefully separated under a dissecting microscope, with various organic substances, such as small herbaceous plants, seeds, leaves, roots, woody debris, humus, etc. removed; specimens of five moss species, two with sporophytes in fairly good condition, were saved.

Determination of the moss species yielded the following results:
*Timmia austriaca* Hedw. 56
*Brachythecium albicans* (Hedw.) Schimp. in B.S.G. 57

---

[1] Research Associate, Missouri Botanical Garden, Box 299, St. Louis, MO 63166
Carl.darigo@sbcglobal.net

*Dicranum spadiceum* Zett. 58
*Aulacomnium acuminatum* (Lindb. & Arnell) Kindb. 59
*Oncophorus wahlenbergii* Brid. 60

Collections were by N. Darigo & B. Craig, with numbers shown above. Specimens are deposited at MO.

*Timmia* was the dominate species, with the Brachythecium second. While all of the species are relatively common in Arctic Alaska, the diversity present in a small random and accidental sample speaks well for the hardiness of these plants in such a forbidding and desolate habitat.

**Acknowledgements.** I thank Bruce Allen for confirming determinations, Nancy Darigo for her description of the habitat and drilling technique, Barbara Murray from University of Alaska, Fairbanks for comments on Alaskan moss distribution, and Nancy Darigo and Bill Craig for permission to publish their collections.

## Literature Cited

Ferrians, O.J., R. Kachadoorian, and G.W. Green. 1969. *Permafrost and related Engineering Problems in Alaska.* U.S. Geological Survey Professional Papers 678, Washington, D.C.

Selkregg, L.L. 1975. *Alaska Regional Profiles, Volume II - Arctic Region.* University of Alaska, Arctic Environmental Information and Data Center, Anchorage, Alaska.

## A report from the twenty-seventh annual Andrews Foray September 2002, Saco, Maine

**Lisa St. Hilaire**[1]

The A. Leroy Andrews Foray is an informal gathering of bryologists from budding beginners to established professionals. We meet yearly in September, for a day and a half of field-tripping and collecting. The 27th Andrews Foray was held September 13-15, 2002, in Saco, Maine and was organized by Alison Dibble and Betsy Newcomer. We stayed in Ocean Park, an old-fashioned cottagy area of Saco, within a few minutes' walk of beach, salt marshes, and tidal creeks. Participants arrived Friday night, and the evening program was a tribute to Howard Crum. Personal, fond, and amusing memories of Howard and time spent with him were revisited and shared with all.

On Saturday, the group headed off to the Massabesic Experimental Forest, a 3600-acre forest with a long history of disturbance including fires, notably a large fire in 1947, and windstorms. This is a federally-owned forest comprised of two units, one in Alfred and the other in Lyman, Maine. The Massabesic was named for Native peoples that once lived in the area, and it is the largest public property in southern Maine. Some of the highlights of the Forest are a large Atlantic white-cedar (*Chamaecyparis thyoides*) swamp, a rare community in Maine, and the federally listed (threatened) small whorled-pogonia (*Isotria medeoloides*). The morning trip was to an Atlantic white-cedar swamp in the southern unit where foray participants had a chance to see and collect *Vulpicida viridis*, an attractive lichen at the northern limit of its range. We lunched near Cook's Brook in the northern unit. Some of us then wandered off to a red maple swamp, and some collected near the brook.

Later in the afternoon we went to Saco Heath, a Nature Conservancy preserve of approximately 1000 acres. Saco Heath is the southern most raised (coalesced dome) bog in Maine. Wooded shrub heath, shrub heath, forested bog, and Atlantic white-cedar bog communities characterize Saco Heath. This is the only place north of the pocosins where Atlantic white-cedar occurs in a domed bog ecosystem.

On Sunday, participants went to Ferry Beach State Park, where we collected in an old growth black gum (*Nyssa sylvatica*) forest and in the dunes and back beach areas. We collected the ephemeral moss *Micromitrium megalosporum*, which is recorded from York County, though not from other areas in Maine.

---

[1] 14 Prospect Street, Augusta Maine 04330-5026

Contributors to the moss and liverwort lists are Bruce Allen, Dick Andrus, Alison Dibble, Joann Hoy, Bob Ingalls, Diane Lucas, Betsy Newcomer, Tom Phillips, Lois Quillinan, Nancy Slack, Dorothy Spaulding, and Sue Williams. Contributors for the lichen lists are Bill Buck, Richard Harris, Elisabeth Lay, and Roman Olszewski. Determinations were made by collectors and were not confirmed by the compiler of this report.

**Massabesic Forest-Southern Unit, Atlantic white-cedar swamp,** -432700N, 704050W, Alfred, York County, Maine, September 14, 2002

Mosses
*Aulacomnium palustre* (Hedw.) Schwaegr.
*Callicladium haldanianum* (Grev.) Crum
*Calliergon cordifolium* (Hedw.) Kindb.
*Calliergon stramineum* (Brid.) Kindb.
*Dicranum polysetum* Sw.
*Dicranum scoparium* Hedw.
*Herzogiella striatella* (Brid.) Iwats.
*Hypnum imponens* Hedw.
*Leucobryum albidum* (P. Beauv.) Lindb.
*Leucobryum glaucum* (Hedw.) Ångstr.
*Orthodicranum montanum* (Hedw.) Loeske
*Orthodicranum viride* (Sull. & Lesq.) Roth
*Platygyrium repens* (Brid.) Schimp.
*Pleurozium schreberi* (Brid.) Mitt.
*Polytrichum juniperinum* Hedw.
*Pseudobryum cinclidioides* (Hüb.) T. Kop.
*Rhizomnium appalachianum* T. Kop.
*Sphagnum bartlettianum* Warnst.
*Sphagnum cuspidatum* Hoffm.
*Sphagnum fallax* (Klinggr.) Klinggr.
*Sphagnum girgensohnii* Russ.
*Sphagnum magellanicum* Brid.
*Sphagnum palustre* L.
*Sphagnum pulchrum* (Braithw.) Warnst.
*Sphagnum recurvum* P. Beauv.
*Sphagnum torreyanum* Sull.
*Steerecleus serrulatus* (Hedw.) Robins.
*Tetraphis pellucida* Milde
*Thuidium delicatulum* (Hedw.) Schimp.
*Ulota crispa* (Hedw.) Brid.

Liverworts
*Bazzania trilobata* (L.) S. Gray

*Calypogeia fissa* (L.) Raddi
*Calypogeia muelleriana* (Schiffn.) K. Müll.
*Cephalozia bicuspidata* (L.) Dum.
*Cephalozia connivens* (Dicks.) Lindb.
*Cladopodiella fluitans* (Nees) Joerg.
*Frullania eboracensis* Gott.
*Mycrolepidozia setaceae* (Web.) Joerg.
*Nowellia curvifolia* (Dicks.) Mitt.
*Pallavicinia lyellii* (Hook.) Gray
*Pellia epiphylla* (L.) Lindb.
*Ptilidium pulcherrimum* (Web.) Hampe
*Riccardia multifida* (L.) S. Gray
*Riccardia palmata* (Hedw.) Carruth.
*Scapania paludicola* Loeske & K. Müll.

Lichens (* = old growth forest off Ida Jim Road, ** = forest adjacent to swamp)
*Allocetraria oakesiana* (Tuck.) Randlane & Thell *
*Aspicilia verrucigera* Hue
*Biatora pycnidiata* Printzen *ined.*
*Buellia stillingiana* J. Steiner
*Calicium abietinum* Ach.
*Calicium glaucellum* Ach.
*Chaenotheca furruginea* (Turner & Borrer) Mig.
*Chaenotheca hygrophila* Tibell
*Chaenotheca phaeocephala* (Turner) Th. Fr.
*Cladonia furcata* (Hudson) Schrader
*Cladonia incrassata* Flörke
*Cladonia macilenta* Hoffm.
*Cladonia ochrochlora* Flörke
*Cladonia scabriuscula* (Delise) Nyl.
*Cladonia squamosa* Hoffm.
*Dimerella pineti* (Ach.) Vězda
*Evernia mesomorpha* Nyl.
*Flavoparmelia baltimorensis* (Gyelnik & Fóriss) Hale
*Flavoparmelia caperata* (L.) Hale
*Fuscidea arboricola* Coppins & Tønsberg
*Graphis scripta* (L.) Ach.
*Hafellia disciformis* (Fr.) Marbach & H. Mayrhofer
*Hypocenomyce scalaris* (Ach.) M. Choisy
*Hypogymnia physodes* (L.) Nyl.
*Imshaugia aleurites* (Ach.) S. F. Meyer
*Lecanora albella* (Pers.) Ach. var. *rubescens* (Imshaug & Brodo) Lumbsch
*Lecanora hybocarpa* (Tuck.) Brodo

*Lecanora pulicaris* (Pers.) Ach.
*Lecanora thysanophora* R. C. Harris
*Lecidea albohyalina* (Nyl.) Th. Fr.
*Lepraria lobificans* Nyl.
*Lepraria neglecta* (Nyl.) Erichsen
*Loxospora elatina* (Ach.) A. Massal.
*Micarea melaena* (Nyl.) Hedl.
*Micarea neostipitata* Coppins & P. May
*Micarea peliocarpa* (Anzi) Coppins & R. Sant.
*Ochrolechia pseudopallescens* Brodo
*Parmelia squarrosa* Hale
*Pertusaria ophthalmiza* (Nyl.) Nyl.
*Pertusaria pustulata* (Ach.) Duby
*Platismatia tuckermannii* (Oakes) Culb. & C. Culb.
*Porpidia albocaerulescens* (Wulfen) Hertel & Knoph **
*Porpidia tahawasiana* Gowan
*Pseudevernia consocians* (Vainio) Hale & Culb.
*Punctelia rudecta* (Ach.) Krog
*Rhizocarpon hochstetteri* (Körber) Vaino
*Ropalospora chlorantha* (Tuck.) S. Ekman
*Trapelia placodioides* Coppins & P. James **
*Trichothelium chloroticum* (Ach.) R. C. Harris
*Tuckermannopsis americana* (Sprengel) Hale
*Usnea lapponica* Vainio *
*Vulpicida viridis* (Schwein.) J.-E. Mattsson & M. J. Lai

Parasites/parasymbionts
*Clypeococcum hypocenomycis* D. Hawksw.
*Lichenoconium erodens* M. S. Christ. & D. Hawksw. on *Parmelia squarrosa* Hale
*Phaeosporobolous usneae* D. Hawksw. & Hafellner on *Ochrolechia pseudopallescens* Brodo
*Stigmidium* sp. on *Dimerella pineti* (Ach.) Vězda

**Massabesic Forest-Northern Unit, Cook's Brook**, -433392N, 703852W, Lyman, York County, Maine, September 14, 2002

Mosses
*Amblystegium serpens* var. *juratzkanum* (Schimp.) Rau & Herv.
*Anomodon attenuatus* (Hedw.) Hüb.
*Atrichum undulatum* (Hedw.) P. Beauv.
*Aulacomnium palustre* (Hedw.) Schwaegr.
*Brachythecium plumosum* (Hedw.) Schimp.

*Bryhnia novae-angliae* (Sull. & Lesq.) Grout
*Callicladium haldanianum* (Grev.) Crum
*Calliergon cordifolium* (Brid.) Kindb.
*Campylium chrysophyllum* (Brid.) J. Lange
*Campylium polygamum* (Schimp.) C. Jens.
*Dicranella heteromalla* (Hedw.) Schimp.
*Dicranum scoparium* Hedw.
*Diphyscium foliosum* (Hedw.) Mohr
*Fissidens bryoides* Hedw.
*Fissidens bushii* (Card. & Thér.) Card. & Thér.
*Fontinalis gigantea* Sull.
*Hypnum imponens* Hedw.
*Hypnum lindbergii* Mitt.
*Hypnum pallescens* (Hedw.) P. Beauv.
*Leskea gracilescens* Hedw.
*Leucobryum glaucum* (Hedw.) Ångstr.
*Leucodon andrewsianus* (Crum & Anderson) Reese & Anderson
*Mnium hornum* Hedw.
*Orthodicranum flagellare* (Hedw.) Loeske
*Orthodicranum viride* (Sull. & Lesq.) Roth
*Orthotrichum obtusifolium* Brid.
*Orthotrichum* cf. *sordidum* Sull. & Lesq.
*Plagiomnium cuspidatum* (Hedw.) T. Kop.
*Plagiothecium laetum* Schimp.
*Platygyrium repens* (Brid.) Schimp.
*Platylomella lescurii* (Sull.) Andrews
*Pleurozium schreberi* (Brid.) Mitt.
*Pohlia wahlenbergii* (Web. & Mohr) Andrews
*Pseudobryum cinclidioides* (Hüb.) T. Kop.
*Pylaisiadelpha recurvans* (Michx.) Buck
*Pylaisiella selwynii* (Hedw.) Crum et al.
*Rhizomnium* cf. *appalachianum* T. Kop.
*Rhizomnium punctatum* (Hedw.) T. Kop.
*Schistidium apocarpum* (Hedw.) Bruch & Schimp.
*Tetraphis pellucida* Milde
*Thuidium delicatulum* (Hedw.) Schimp.
*Ulota crispa* (Hedw.) Brid.

Liverworts
*Aneura pinguis* (L.) Dum.
*Cephaloziella hampeana* (Nees) Schiffn. *ex* Loeske
*Chiloscyphus polyanthos* (L.) Corda
*Geocalyx graveolens* (Schrad.) Nees

*Lejeunea cavifolia* (Ehrh.) Lindb.
*Lophocolea heterophylla* (Schrad.) Dum.
*Nowellia curvifolia* (Dicks.) Mitt.
*Odontoschisma denudatum* (Nees *ex* Mart.) Dum.
*Pallavicinia lyellii* (Hook.) Carruth.
*Pellia epiphylla* (L.) Corda
*Pellia neesiana* (Gott.) Limpr.
*Porella pinnata* L.
*Porella platyphylla* (L.) Pfeiff.
*Ptilidium pulcherrimum* (Web.) Hampe
*Radula complanata* (L.) Dum.
*Riccardia latifrons* Lindb.
*Riccardia palmata* (Hedw.) Carruth.
*Scapania nemorea* (L.) Groll.
*Scapania undulata* (L.) Dum.

**Massabesic Forest-Northern Unit, Red maple swamp**, -433240N, 703930W, Lyman, York County, Maine, September 14, 2002

Mosses
*Aulacomnium palustre* (Hedw.) Schwaegr.
*Leptodictyum riparium* (Hedw.) Loeske
*Leucodon brachypus* Brid.
*Neckera pennata* Hedw.
*Orthodicranum montanum* (Hedw.) Loeske
*Plagiothecium laetum* Schimp.
*Sphagnum affine* Ren. & Card.
*Sphagnum atlanticum* Andrus *in sched.*
*Sphagnum cuspidatum* Hoffm.
*Sphagnum fallax* (Klinggr.) Klinggr.
*Sphagnum fimbriatum* Wils.
*Sphagnum girgensohnii* Russ.
*Sphagnum henryense* Warnst.
*Sphagnum magellanicum* Brid.
*Sphagnum palustre* L.
*Sphagnum pulchrum* (Braithw.) Warnst.
*Sphagnum quinquefarium* (Braith.) Warnst.
*Sphagnum recurvum* P. Beauv.
*Sphagnum russowii* Warnst.
*Sphagnum subtile* (Rus.) Warnst.
*Sphagnum torreyanum* Sull.
*Tetraphis pellucida* Milde
*Thuidium delicatulum* (Hedw.) Schimp.

*Warnstorfia fluitans* (Hedw.) Loeskse

Liverworts

*Calypogeia fissa* (L.) Raddi
*Porella platyphylla* (L.) Pfeiff.

Lichens

*Amandinea polyspora* (Willey) E. Lay & P. May
*Anaptychia palmulata* (Michaux) Vainio
*Arthonia caesia* (Flotow) Körber
*Anisomeridium polypori* (Ellis & Everh.) M. E. Barr
*Bacidia polychroa* (Th. Fr.) Körber
*Bacidia rubella* (Hoffm.) A. Massal. + *Bacidia diffracta* S. Ekman
*Bacidia schweinitzii* (Fr. *ex* E. Michener) A. Schneider
*Biatora longispora* (Degel.) R. C. Harris *ined.*
*Buellia dialyta* (Nyl.) Tuck.
*Buellia stillingiana* Steiner
*Caloplaca flavorubescens* (Hudson) J. R. Laundon
*Candelaria concolor* (Dickson) Stein
*Cladonia squamosa* Hoffm.
*Clypeococcum hypocenomycis* D. Hawksw.
*Collema subflaccidum* Degel.
*Eopyrenula intermedia* Coppins
*Flavoparmelia caperata* (L.) Hale
*Fuscidea arboricola* Coppins & Tønsberg
*Graphis scripta* (L.) Ach.
*Heterodermia speciosa* (Wulfen) Trevisan
*Hypocenomyce scalaris* (Ach.) M. Choisy
*Hypogymnia physodes* (L.) Nyl.
*Julella fallaciosa* (Arnold) R. C. Harris
*Lecanora pulicaris* (Pers.) Ach.
*Lecanora strobilina* (Sprengel) Kieffer
*Lecanora symmicta* (Ach.) Ach.
*Leptogium cyanescens* (Rabenh.) Körber
*Leptogium millegranum* Sierk
*Lithothelium hyalosporum* (Nyl.) Aptroot
*Lobaria pulmonaria* (L.) Hoffm.
*Lobaria quercizans* Michaux
*Loxospora cismonica* (Beltr.) Hafellner
*Melanelia fuliginosa* (Fr. *ex* Duby) Essl.
*Micarea neostipitata* Coppins & P. May
*Mycocalicium albonigrum* (Nyl.) Fink
*Mycocalicium subtile* (Pers.) Szatala

*Ochrolechia arborea* (Kreyer) Almb.
*Pachyphiale fagicola* (Hepp) Zwackh
*Parmelia squarrosa* Hale
*Peltigera praetextata* (Flörke *ex* Sommerf.) Zopf
*Pertusaria amara* (Ach.) Nyl.
*Pertusaria trachythallina* Erichsen
*Phaeophyscia rubropulchra* (Degel.) Essl.
*Platismatia tuckermanii* (Oakes) Culb. & C. Culb.
*Punctelia rudecta* (Ach.) Krog
*Pyrrhospora varians* (Ach.) R. C. Harris
*Pyxine sorediata* (Ach.) Mont.
*Rinodina subminuta* H. Magn.
*Ropalospora chlorantha* (Tuck.) S. Ekman
*Scoliciosporum chlorococcum* (Stenh.) Vězda

Parasites/parasymbionts
*Cornutispora ciliata* Kalb. on *Fuscidea arboricola* Coppins and Tønsberg

**Massabesic Forest, location unspecified** (if not listed above), September 14, 2002

Mosses
*Bryum pseudotriquetrum* (Hedw.) Gaertn. et al.
*Buxbaumia aphylla* Hedw.
*Climacium dendroides* (Hedw.) Web. & Mohr
*Fontinalis novae-angliae* Sull.
*Polytrichum piliferum* Hedw.
*Ptilium crista-castrensis* (Hedw.) De Not.
*Rhodobryum ontariense* (Kindb.) Kindb.
*Sphagnum angustifolium* (Russ.) C. Jens.
*Sphagnum flavicomans* (Card.) Warnst.
*Sphagnum flexuosum* Dozy & Molk.
*Sphagnum isoviitae* Flatb.
*Sphagnum lescurii* Sull.
*Sphagnum squarrosum* Crome

Liverworts
*Frullania asagrayana* Mont.
*Frullania eboracensis* Gott.
*Porella platyphylloidea* (Schwein.) Lindb.
*Riccardia multifida* (L.) S. Gray

**Saco Heath**, -433300N, 702800W, Saco, York County, Maine, September 14, 2002

Mosses
*Sphagnum angustifolium* (Russ.) C. Jens.
*Sphagnum bartlettianum* Warnst.
*Sphagnum capillifolium* (Ehrh.) Hedw.
*Sphagnum cuspidatum* Hoffm.
*Sphagnum fallax* (Klinggr.) Klinggr.
*Sphagnum girgensohnii* Russ.
*Sphagnum isoviitae* Flatb.
*Sphagnum magellanicum* Brid.
*Sphagnum papillosum* Lindb.
*Sphagnum rubellum* Wils.
*Sphagnum russowii* Warnst.
*Sphagnum subtile* (Rus.) Warnst.
*Sphagnum tenellum* (Brid.) Bory
*Sphagnum torreyanum* Sull.

Liverworts
*Mylia anomala* (Hook.) S. Gray

Lichens
*Cladonia caespiticia* (Pers.) Flörke
*Cladonia grayi* G. Merr. *ex* Sandst.
*Evernia mesomorpha* Nyl.
*Fuscidea arboricola* Coppins & Tønsberg
*Hypocenomyce scalaris* (Ach.) M. Choisy
*Hypogymnia physodes* (L.) Nyl.
*Imshaugia aleurites* (Ach.) S. F. Meyer
*Imshaugia placorodia* (Ach.) S. F. Meyer
*Lecanora minutella* Nyl.
*Lecanora pulicaris* (Pers.) Ach.
*Lecanora strobilina* (Sprengel) Kieffer
*Micarea neostipitata* Coppins & P. May
*Ochrolechia arborea* (Kreyer) Almb.
*Parmelia sulcata* Taylor
*Parmeliopsis capitata* R. C. Harris *ex* J. Hinds & P. Hinds
*Pseudevernia consocians* (Vainio) Hale & Culb.
*Rimularia caeca* (Lowe) Rambold & Printzen
*Scoliciosporum chlorococcum* (Stenh.) Vězda
*Trapeliopsis flexuosa* (Fr.) Coppins & P. James
*Trapeliopsis viridescens* (Schrader) Coppins & P. James

*Tuckermannopsis americana* (Sprengel) Hale
*Tuckermannopsis sepincola* (Ehrh.) Hale

Parasites/parasymbionts
*Cornutispora ciliata* Kalb. on *Ochrolechia arborea* (Kreyer) Almb.
*Spirographa* sp. on *Ochrolechia arborea* (Kreyer) Almb.

**Ferry Beach State Park-Tupelo swamp, dunes, mixed forest**, -432840N, 702315W, Saco, York County, Maine, September 15, 2002

Mosses
*Anacamptodon splachnoides* (Brid.) Brid.
*Atrichum angustatum* (Brid.) Bruch & Schimp.
*Atrichum crispum* (James) Sull.
*Atrichum undulatum* (Hedw.) P. Beauv.
*Aulacomnium palustre* (Hedw.) Schwaegr.
*Brachythecium campestre* (C. Müll.) Schimp.
*Brachythecium reflexum* (Starke) Schimp.
*Brachythecium rivulare* Schimp.
*Brachythecium rutabulum* (Hedw.) Schimp.
*Brachythecium salebrosum* (Web. & Mohr) Schimp.
*Bryhnia novae-angliae* (Sull. & Lesq.) Grout
*Callicladium haldanianum* (Grev.) Crum
*Calliergon cordifolium* (Brid.) Kindb.
*Ceratodon purpureus* (Hedw.) Brid.
*Climacium americanum* Brid. (*kindbergii* experession)
*Dichelyma capillaceum* (With.) Myr.
*Dicranum scoparium* Hedw.
*Ephemerum spinulosum* Schimp.
*Hypnum curvifolium* Hedw.
*Hypnum imponens* Hedw.
*Hypnum pallascens* (Hedw.) P. Beauv.
*Leptodictyum riparium* (Hedw.) Loeske
*Leucobryum glaucum* (Hedw.) Ångstr.
*Micromitrium megalosporum* Aust.
*Mnium hornum* Hedw.
*Neckera pennata* Hedw.
*Orthodicranum flagellare* (Hedw.) Loeske
*Orthodicranum montanum* (Hedw.) Loeske
*Orthodicranum viride* (Sull. & Lesq.) Roth
*Plagiomnium cuspidatum* (Hedw.) T. Kop.
*Platiothecium laetum* Schimp.
*Platygyrium repens* (Brid.) Schimp.

*Pleurozium schreberi* (Brid.) Mitt.
*Pohlia nutans* (Hedw.) Lindb.
*Polytrichum commune* Hedw.
*Polytrichum juniperinum* Hedw.
*Polytrichum piliferum* Hedw.
*Pseudobryum cinclidioides* (Hüb.) T. Kop.
*Pylaisiadelpha recurvans* (Michx.) Buck
*Pylaisiella selwynii* (Hedw.) Crum et al.
*Rhizomnium appalachianum* T. Kop.
*Sphagnum affine* Ren. & Card.
*Sphagnum bartlettianum* Warnst.
*Sphagnum capillifolium* (Ehrh.) Hedw.
*Sphagnum carolinianum* Andrus
*Sphagnum cuspidatum* Hoffm
*Sphagnum fallax* (Klinggr.) Klinggr.
*Sphagnum fimbriatum* Wils.
*Sphagnum flavicomans* (Card.) Warnst.
*Sphagnum girgensohnii* Russ.
*Sphagnum henryense* Warnst.
*Sphagnum lescurii* Sull.
*Sphagnum magellanicum* Brid.
*Sphagnum palustre* L.
*Sphagnum pulchrum* (Braithw.) Warnst.
*Sphagnum recurvum* P. Beauv.
*Sphagnum subtile* (Rus.) Warnst.
*Sphagnum torreyanum* Sull.
*Steerecleus serrulatus* (Hedw.) Robins.
*Tetraphis pellucida* Milde
*Thelia hirtella* (Hedw.) Sull.
*Thuidium delicatulum* (Hedw.) Schimp.
*Ulota coarctata* (P. Beauv.) Hammar
*Ulota crispa* (Hedw.) Brid.

Liverworts
*Bazzania trilobata* (L.) S. Gray
*Cephaloziella* cf *hampeana* (Nees) Schiffn.
*Chiloscyphus polyanthos* (L.) Corda
*Fossombronia foveolata* Lindb.
*Frullania asagrayana* Mont.
*Frullania bolanderi* Aust.
*Frullania eboracensis* Gott.
*Jamesoniella autumnalis* (DC.) Steph.
*Nowellia curvifolia* (Dicks.) Mitt.

*Pellia epiphylla* (L.) Corda
*Porella platyphylla* (L.) Pfeiff.
*Radula complanata* (L.) Dum.
*Scapania nemorea* (L.) Groll.

Lichens (* = on dunes)
*Allocetraria oakesiana* (Tuck.) Randlane & Thell
*Biatora pycnidiata* Printzen *ined.*
*Biatora toensbergii* Holien & Printzen
*Bryoria furcellata* (Fr.) Brodo & D. Hawksw.
*Buellia stillingiana* J. Steiner
*Cetraria arenaria* Kärnefelt *
*Chaenotheca brunneoloa* (Ach.) Müll. Arg.
*Chaenotheca hygrophila* Tibell
*Cladonia coniocraea* (Flörke) Sprengel
*Cladonia cristatella* Tuck. *
*Cladonia grayi* G. Merr. *ex* Sandst.
*Cladonia mitis* Sandst. *
*Cladonia ochrochlora* Flörke
*Cladonia rangiferina* (L.) F. H. Wigg. *
*Cladonia squamosa* Hoffm.
*Cladonia stellaris* (Opiz) Pouzar & Vězda *
*Cladonia submitis* (A. Evans) *
*Cladonia uncialis* (L.) F. H. Wigg. *
*Cyphelium tigillare* (Ach.) Ach. *
*Evernia mesomorpha* Nyl. *
*Flavoparmelia caperata* (L.) Hale
*Graphis scripta* (L.) Ach.
*Hafellia disciformis* (Fr.) Marbach & H. Mayrhofer
*Hypocenomyce friesii* (Ach.) P. James & Gotth. Schneider
*Hypogymnia physodes* (L.) Nyl.
*Imshaugia aleurites* (Ach.) S. F. Meyer
*Julella fallaciosa* (Arnold) R. C. Harris
*Lecanora caesiorubella* ssp. *prolifera* (Fink) R. C. Harris
*Lecanora hybocarpa* (Tuck.) Brodo
*Lecanora minutella* Nyl. *
*Lecanora pulicaris* (Pers.) Ach.
*Lecanora strobilina* (Sprengel) Kieffer *
*Lecanora symmicta* (Ach.) Ach.
*Lecanora thysanophora* R. C. Harris
*Lepraria lobificans* Nyl.
*Loxospora elatina* (Ach.) A. Massal.
*Loxospora pustulata* (Brodo & Culb.) R. C. Harris

*Melanelia subaurifera* (Nyl.) Essl. *
*Micarea neostipitata* Coppins & P. May
*Ochrolechia arborea* (Kreyer) Almb.
*Ochrolechia pseudopallescens* Brodo
*Parmelia squarrosa* Hale
*Parmelia sulcata* Taylor
*Pertusaria amara* (Ach.) Nyl.
*Pertusaria ophthalmiza* (Nyl.) Nyl.
*Pertusaria sulcata* Dibben
*Phaeocalicium polyporaeum* (Nyl.) Tibell
*Phaeographis inusta* (Ach.) Müll. Arg.
*Placynthiella oligotropha* (J. R. Laundon) Coppins & P. James *
*Platismatia tuckermanii* (Oakes) Culb. & C. Culb.
*Punctelia rudecta* (Ach.) Krog
*Punctelia subrudecta* (Nyl.) Krog
*Ramalina intermedia* (Delise *ex* Nyl.) Nyl.
*Ramalina roesleri* (Hochst. *ex* Schaerer) Hue
*Ropalospora chlorantha* (Tuck.) S. Ekman
*Segestria leptalea* (Durieu & Mont.) R. C. Harris
*Scoliciosporum chlorococcum* (Stenh.) Vězda *
*Trapeliopsis granulosa* (Hoffm.) Lumbsch *
*Trapeliopsis viridescens* (Schrader) Coppins & P. James
*Tuckermannopsis americana* (Sprengel) Hale *
*Tuckermannopsis fendleri* (Nyl.) Hale *
*Usnea ceratina* Ach.
*Usnea strigosa* (Ach.) Eaton

Parasites/parasymbionts
*Lichenoconium* sp. on *Parmelia squarrosa* Hale
*Nectriopsis parmeliae* (Berk. & M. A. Curtis) M. S. Cole & D. Hawksw. on *Punctelia rudecta* (Ach.) Krog
*Pronectria oligospora* Lowen & Rogerson on *Punctelia rudecta* (Ach.) Krog
*Sclerococcum simplex* D. Hawksw. on *Pertusaria trachythallina* Erichsen
*Skyttea radiatilis* (Tuck.) R. Sant. et al. on *Loxospora pustulata* (Brodo & Culb.) R. C. Harris
*Spirographa* sp. on *Ochrolechia arborea* (Kreyer) Almb.
*Stigmidium* sp. on *Parmelia squarrosa* Hale

# Clara Cummings Walk nets *Lecanora conizaeoides* for the Boston area

**Elizabeth Kneiper[1], Elisabeth Lay[2], Douglas Greene[3], Scott LaGreca[4], Francis and Margaret LeBaron[5]**

In 1994 the Friends of the Farlow of Harvard University initiated The Clara Cummings Walk, an annual spring walk named for Clara Cummings (1855-1906), who taught at Wellesley College from 1879 to 1906 and issued "Decades of North American Lichens" and "Lichenes Boreali-Americani" (Fink 1907; Seaver 1911). Professor Cummings was admired for her commitment to teaching and for her ability to identify bryophytes and lichens (Brodo 2000; Fink 1907). On the Clara Cummings walk, FOF members and invited guests visit local sites to share their interests in New England bryophytes, lichens and fungi, and to enjoy a picnic lunch.

The 2000 Clara Cummings Walk was held at Ponkapoag Bog in the Blue Hills Reservation, located south of Boston in the town of Canton in Norfolk County, Massachusetts. The bog contains multiple vegetation types (Judd 1980), including a well-developed *Chamaecyparis thyoides* (Atlantic white cedar) forest. The bog has been listed as an Area of Critical Environmental Concern (http://www.state.ma.us/dem/programs/acec/acecs.htm ).

Dr. Norton Miller, our invited bryophyte specialist for the walk, led the group into the bog on the rickety boardwalk, while teaching us all to appreciate the diversity of *Sphagnum* species underfoot. The lichenologists on the walk noticed an unusual *Lecanora* on a white cedar stump similar to the common *Lecanora strobilina* but with a very sorediate thallus. The suspicion was that we had run into the sought-after fertile thallus of *Lecanora conizaeoides*. In 1978 Elizabeth Kneiper collected sterile *Lecanora conizaeoides* off pine in the St. Joseph's Cemetery in West Roxbury, Massachusetts, about 10 miles from the Ponkapoag Bog (Laundon 2003).

Those of us in the group who had participated in the 1999 Tuckerman Lichen Workshop in Nova Scotia hosted by Dr. David Richardson of St. Mary's University had been shown fertile *Lecanora conizaeoides* in a Halifax cemetery. Dr. Richardson encouraged us to "keep an eye out " for this *Lecanora* in the

---

[1] 35 Woodchester Drive, Weston, MA 02493, ekneiper@aol.com
[2] 239 Marlborough St., Boston, MA 02116, lay239@aol.com
[3] 31 Cape Cod Avenue, Reading, MA 01867, atmame77@aol.com
[4] Farlow Herbarium, 22 Divinity Avenue, Cambridge, MA 02138, slagreca@oeb.harvard.edu
[5] 111 Heathwood, Yarmouth Port 02675 f.lebaron@comcast.net

Boston area but floristic work by many of us had yet to net fertile *Lecanora conizaeoides* for Massachusetts.

Following the walk, Scott LaGreca obtained a permit from Mark Castle of the Metropolitan District Commission of Boston, Massachusetts to collect *Lecanora conizaeoides* in the bog. Those of us who accompanied him on this collecting trip were impressed by the strong preference this lichen appeared to have for the wood of Atlantic white cedar. Follow-up work on the distribution of *Lecanora conizaeoides* in New England done by S. LaGreca and B.W. Stutzman, a student then enrolled in Donald Pfister's lichenology class at Harvard University, is in preparation (LaGreca & Stutzman in prep.).

The leaders of the Clara Cummings Walk cannot promise species range extensions or new state or North American records, but we can promise the company of a lively group on a lovely spring walk. If you live locally or are visiting the Boston area please join us for the Clara Cummings Walk and share your expertise. Check the Friends of the Farlow website: http://www.huh.harvard.edu/collections/fof/fof.html for the date and location of this spring walk and other FOF events.

## Literature Cited

Brodo, I. M. 2000. Lichenology in the American Bryological and Lichenological Society—1899-1999. *The Bryologist* 103: 15-27.

Fink, B. 1907. A memoir of Clara Cummings. *The Bryologist* 10: 36-41.

Judd, W. S. 1980. Bryophytes of the peat mat at Ponkapoag Pond, eastern Massachusetts, with taxonomic and ecological notes on *Sphagnum*. *Rhodora* 82: 563-578.

LaGreca, S. and B.W. Stutzman. In prep. The curious habits of the lichen *Lecanora conizaeoides* in eastern Massachusetts. To be submitted to: *The Bryologist.*

Laundon, J.R. 2003. Six lichens in the *Lecanora varia* group. *Nova Hedwigia* 76: 83-111.

Seaver, F. J. 1911. Students and investigators at the New York Botanical Garden 1897-1911. *Journal of the New York Botanical Garden* 12: 125.

## Guide to contributors to *EVANSIA*

The aim of *Evansia* is to provide a vehicle for the presentation and exchange of useful information on North American bryophytes and lichens. Articles are frequently popular in nature rather than technical and are intended to teach and inform both amateurs and professionals. The articles include, but are not restricted to, announcements of and reports on forays and meetings, presentations of techniques and aids for studying and curating lichens and bryophytes, and reports on local floras. Checklists and papers documenting new regional, state, or county records must include voucher specimens (collector and collection number) and an indication of where the specimens are deposited or a literature reference.

*Evansia* is published with the aid of desktop publishing software and manuscripts should be submitted on computer diskette. The diskette must be IBM compatible (any size) with the author's name, manuscript file name, and word processing software indicated on the disk. Most word processing files can be converted with little effort however an ASCII .txt copy should be sent if you are not using a standard word processor or if the file must be converted from an Apple software.

Manuscripts and correspondence may also be submitted by e-mail to the address listed below. The word processed document should be an attachment to a message. After the manuscript has been successfully received it will be acknowledged by e-mail. Please note that if you are sending ASCII text rather than an attachment an original copy of the manuscript must also be sent to the Editor. At this time only some images can be extracted from diskette, thus a good quality copy of any illustration should also be mailed.

**IMPORTANT:** Authors should not spend time elaborately formatting their manuscript and should avoid numerous font changes, using footnotes, or other special features. When the manuscript is formatted for *Evansia* most of this work will have to be removed. Note that *Italics*, **bolding** and underlining must be included where appropriate. See recent copies of *Evansia* for style and highlighting of similar manuscripts.

**Manuscripts and diskettes should be sent to the Editor:**

Robert E. Magill, Missouri Botanical Garden
P.O. Box 299, St. Louis, MO 63166-0299.
e-mail: bob.magill@mobot.org Phone (314) 577-5161. Fax (314) 577-0830

EVANSIA
Bryology Laboratory
Missouri Botanical Garden
P.O. Box 299
Saint Louis, MO 63166-0299 USA

NON-PROFIT ORG.
U.S. POSTAGE
PAID
ST. LOUIS, MO
PERMIT NO. 3566

LUESTER T. MERTZ
LIBRARY
DEC 1 7 2003
NEW YORK
BOTANICAL GARDEN

RICHARD C. HARRIS
NEW YORK BOTANICAL GARDEN
BRONX NY 10458-5126